
MEDICO CHIRURGICAL SOCIETY
EDINBURGH

THE TRANSACTIONS

OF THE

MEDICO-CHIRURGICAL SOCIETY OF EDINBURGH.

THE TRANSACTIONS

OF THE

MEDICO-CHIRURGICAL SOCIETY OF EDINBURGH.

VOL. I.

SESSION 1881-82.

EDINBURGH: OLIVER AND BOYD,
PUBLISHERS TO THE SOCIETY.
1882.

PRINTED BY OLIVER AND BOYD, TWEEDDALE COURT, EDINBURGH.

PREFACE.

The Medico-Chirurgical Society of Edinburgh this year enters on a new era by the publication of an Annual Volume of Transactions, and the presentation of the same to each Ordinary Member.

The present volume is the first of the series, and contains a record of the work done during the past Session.

That work embraces the communication of Original Papers; the exhibition of Patients, illustrating rare and interesting forms of disease; and the exhibition of Pathological and other specimens so essential to the proper understanding of the morbid changes which take place in the human body.

It is hoped that the publication of the Transactions in this permanent form will prove a valuable contribution to medical literature, will encourage the members to take a more active part in the work of the Society, and will tend in no small degree to increase the influence and usefulness of the Medico-Chirurgical Society of Edinburgh.

William Craig,
Editor.

October 1882.

Medico-Chirurgical Society of Edinburgh.

INSTITUTED 1821.

OFFICE-BEARERS FOR SESSION 1881-82.

PRESIDENT.

GEORGE W. BALFOUR, M.D., F.R.C.P. Ed.

VICE-PRESIDENTS.

Professor ALEXANDER R. SIMPSON, M.D., F.R.C.P. Ed.
JOSEPH BELL, F.R.C.S. Ed.
Professor THOMAS R. FRASER, M.D., F.R.C.P. Ed.

TREASURER.

ALEXANDER G. MILLER, F.R.C.S. Ed., 11 Walker Street.

SECRETARIES.

DAVID J. BRAKENRIDGE, M.D., F.R.C.P. Ed., 10 St Colme Street.
C. WATSON MACGILLIVRAY, M.D., F.R.C.S. Ed., 11 Rutland Street.

MEMBERS OF COUNCIL.

JAMES YOUNG, M.D.
Professor D. J. HAMILTON, M.B., F.R.C.S. Ed., Aberdeen.
W. ALLAN JAMIESON, M.D., F.R.C.P. Ed.
H. MACDONALD CHURCH, M.D., F.R.C.P. Ed.
WILLIAM ZEIGLER, M.D., F.R.C.P. Ed.
O. H. GARLAND, M.B., M.R.C.P. Ed., Leith.
C. H. THATCHER, F.R.C.S. Ed.
ROBERT LUCAS, M.D., Dalkeith.

LIST of Presidents, Vice-Presidents, Treasurers, and Secretaries of the Society.

PRESIDENTS.

Note.—The Presidents continue in office two years.

Dr Duncan, Sen.,	1821	Dr Seller,	1854
James Russel, Esq.,	1823	James Miller, Esq.,	1856
Dr John Thomson,	1825	James Goodsir, Esq,	1858
Dr Kellie,	1827	Benjamin Bell, Esq.,	1859
Dr Abercrombie,	1829, 1831	James Spence, Esq.,	1861
Dr Alison,	1833	Dr Douglas Maclagan,	1863
Sir Robert Christison, Bart.,	1835	Dr John Moir,	1865
William Wood, Esq.,	1837, 1839	Dr Robert Omond,	1867
Dr Maclagan,	1840	Dr Bennett,	1869
Dr Graham,	1842	Dr Handyside,	1871
Dr Gairdner,	1844	Dr Haldane,	1873
Dr R. Hamilton,	1846	Dr Gillespie,	1875
James Syme, Esq.,	1848	Dr Sanders,	1877
Dr Begbie,	1850	Dr P. H. Watson,	1879
Sir J. Y. Simpson, Bart.,	1852	Dr G. W. Balfour,	1881

VICE-PRESIDENTS.

Note.—The Vice-Presidents continue in office three years.

Sir Robert Christison, Bart.,	1833	Dr W. R. Sanders,	1867
William Brown, Esq.,	1839, 1843	Dr Thomas Keith,	1868
Dr Maclagan,	1850, 1862	Dr Matthews Duncan,	1869
Dr Combe,	1851	Joseph Lister, Esq.,	1870
Dr Omond,	1854, 1866	Dr R. Paterson,	1871
Benjamin Bell, Esq.,	1856	Dr P. H. Watson,	1872
James Spence, Esq.,	1857	Dr G. W. Balfour,	1873
Dr Charles Wilson,	1858	Dr Littlejohn,	1874
Dr Inglis,	1859	Dr Keiller,	1875
Dr W. T. Gairdner,	1861	Dr Argyll Robertson,	1876
Dr Andrew Wood,	1862	Dr Grainger Stewart	1877
Dr P. D. Handyside,	1863	Thomas Annandale, Esq.,	1878
Dr Rutherford Haldane,	1864	Dr Alexander R. Simpson,	1879
Dr J. D. Gillespie,	1865	Joseph Bell, Esq.,	1880
Dr Halliday Douglas,	1867	Dr T. R. Fraser,	1881

TREASURERS.

James Bryce, Esq.,	1821 to 1826	Dr George W. Balfour,	1863 to 1872
Dr Gairdner,	1826 to 1843	Joseph Bell, Esq.,	1872 to 1880
Dr Omond,	1843 to 1854	A. G. Miller, Esq.,	1880
Dr John Struthers,	1854 to 1863		

Note.—The Treasurer and Secretaries are elected annually.

SECRETARIES.

Dr Alison,	1821 to 1823	Dr J. D. Gillespie,	1857 to 1864
Dr R. Hamilton,	1821 to 1830	Dr P. H. Watson,	1858 to 1867
Dr J. C. Gregory,	1830 to 1833	Dr Dycer,	1864 to 1867
William Brown, Esq.,	1833 to 1839	Dr Grainger Stewart,	1867 to 1870
Dr W. Thomson,	1833 to 1840	Dr Argyll Robertson,	1867 to 1872
Dr Douglas Maclagan,	1839 to 1846	Dr Muirhead,	1870 to 1876
Dr James Duncan,	1840 to 1845	John Chiene, Esq.,	1872 to 1877
Dr John Taylor,	1846 to 1851	Dr Wyllie,	1876 to 1879
Dr J. H. Bennett,	1846 to 1848	Dr Cadell,	1877 to 1881
Dr Wm. Robertson,	1848 to 1851	Dr Brakenridge,	1879
Dr W. T. Gairdner,	1851 to 1857	Dr MacGillivray,	1881
Dr J. W. Begbie,	1852 to 1858		

HONORARY MEMBERS.

William Bowman, Esq., London,	1869	Prof. Gross, Philadelphia,	1877
Prof. Helmholtz, Berlin,	1869	Prof. Von Langenbeck, Berlin,	1877
Prof. Virchow, Berlin,	1869	Prof. Kölliker, Würtzburg	1878
Sir Thos. Watson, Bart., London,	1869	Prof. Donders, Utrecht	1878
Sir James Paget, Bart., London,	1871	Prof. Marion Sims, New York,	1882

FOREIGN CORRESPONDING MEMBERS.

M. Louis, Paris,	1857	Prof. Buhl, Munich,	1870
Prof. Skoda, Vienna,	1857	Prof. Bigelow, Boston,	1870
Prof. Sigmund, Vienna,	1858	Dr C. R. Agnew, New York,	1877
Prof. Porta, Pavia,	1858	Dr W. A. Hammond, New York,	1877
Prof Bouillaud, Paris,	1858	Dr Edmund Hansen, Copenhagen,	1877
Dr Devergie, Paris,	1858	Dr D. B. St John Roosa, New York,	1877
Prof. Faye, Christiana,	1861	Dr Henry W. Williams, Boston,	1877
Prof. Huss, Stockholm,	1861	Prof. Charcot, Paris,	1878
Prof. G. B. Wood, Philadelphia,	1861	Prof. Ludwig, Leipsic,	1878
Prof. Hyrtl, Vienna,	1861	Prof. Connheim, Leipsic,	1878
Prof. Henle, Göttingen,	1861	Prof. Stricker, Vienna,	1878
Prof. Billroth, Vienna,	1869	Dr Wortabet, Beyrout,	1879
Prof. Breisky, Prague,	1869	Prof. Hegar, Freiburg,	1880
M. Brown Sequard, Paris,	1869	Prof. Albert, Innsbrück,	1880
Prof. Brücke, Vienna,	1869	Prof. Esmarch, Kiel,	1880
Prof. Bucheim, Dorpat,	1869	Dr Lewis Sayre, New York,	1880
Prof. du Bois-Reymond, Berlin,	1869	Prof. W. H. Van Buren, New York,	1882
Prof. Kühne, Heidelberg,	1869	Prof. D. W. Yandell, Louisville, Kentucky,	1882
M. Marey, Paris,	1869	Prof. Leon Lefort, Paris,	1882
Prof. Rudneff, St Petersburg,	1869	Dr J. Lucas-Championnière, Paris,	1882
Prof. Wagner, Königsberg,	1869	Prof. C. Hueter, Griefswald,	1882
Prof. Hecker, Munich,	1870		

CORRESPONDING MEMBERS IN THE UNITED KINGDOM.

Dr Latham, London,	1857	Dr Burdon-Sanderson, London,	1878
Dr West, London,	1857	Dr Hughlings Jackson, London,	1878
Richard Quain, Esq., London,	1857	Sir Wm. Gull, London,	1878
Sir William Jenner, Bart., London,	1869	Thos. Spencer Wells, Esq., London,	1880
Dr John W. Ogle, London,	1869	Dr C. J. B. Williams, London,	1880
Dr Pavy, London,	1869	Dr J. T. Banks, Dublin,	1880
Dr Roberts, Manchester,	1869	George H. Porter, Esq., Dublin,	1880
Dr Walshe, London,	1869	Prof. Pirrie, Aberdeen,	1880
Dr Samuel Wilks, London,	1869	Dr Andrew Clark, London,	1882
R. Brudenell Carter, Esq., London,	1877	Dr A. White Barclay, London,	1882

ORDINARY MEMBERS.

Note.—Those marked with an Asterisk have been Members of Council. Members of Council continue in office two years.

RESIDENT.

		Date of Admission.
	* Dr J. O. Affleck, 12 Claremont Place,	1871
	* Dr James Andrew, 6 Hope Street,	1869
	* Professor Annandale, 34 Charlotte Square,	1863
	Dr W. Badger, Penicuik,	1882
5	* Professor Balfour, Inverleith House,	1833
	* Dr Andrew Balfour, Portobello,	1874
	Dr J. H. Balfour, Portobello,	1881
	* Dr G. W. Balfour, 17 Walker Street, *President*,	1847

		Date of Admission.
	* Dr Thomas Balfour, 51 George Square,	1856
10	* Dr Ballantyne, Dalkeith,	1873
	Dr A. H. Barbour, 52 Queen Street,	1881
	Dr T. G. Beilby, Falcon Cottage, Morningside,	1852
	*** Benjamin Bell, Esq., 18 Coates Crescent,	1836
	* Dr Charles Bell, 10 Chalmers Street,	1844
15	* Joseph Bell, Esq., 20 Melville Street, *Vice-President*,	1862
	G. H. Bentley, Esq., Kirkliston,	1877
	* Dr Bishop, 12 Walker Street,	1872
	Dr W. T. Black, 2 George Square,	1877
	* Dr Bleloch, 13 Brougham Street,	1871
20	* Dr Brakenridge, 10 St Colme Street, *Secretary*,	1865
	Dr Byrom Bramwell, 23 Drumsheugh Gardens,	1876
	Dr J. Graham Brown, 63 Castle Street,	1878
	* William Brown, Esq., 25 Dublin Street,	1821
	* Dr Robert Bruce, 12 York Place,	1858
25	Dr Buist, 2 Grosvenor Street,	1877
	* Dr Burn, 45 Lauriston Place,	1847
	* Dr Cadell, 20 Castle Street,	1870
	Dr W. Watson Campbell, Duns,	1877
	* Dr Cappie, 47 Lauriston Place,	1855
30	* Dr J. Carmichael, 42 Northumberland Street,	1870
	* Professor John Chiene, 21 Ainslie Place,	1867
	* Dr Church, 36 George Square,	1876
	* Dr Clouston, Morningside Asylum,	1871
	Dr A. R. Coldstream, 2 Newington Terrace,	1878
35	*** Dr Combe, 36 York Place,	1822
	Dr Cotterill, 24 Melville Street,	1878
	* Dr William Craig, 7 Lothian Road,	1869
	* Dr Halliday Croom, 25 Charlotte Square,	1870
	* Dr Cumming, 18 Ainslie Place,	1845
40	* Dr R. J. B. Cunynghame, 6 Walker Street,	1868
	* Dr Archibald Dickson, 11 Royal Circus,	1871
	** Dr Halliday Douglas, 30 Melville Street,	1842
	* Dr John Duncan, 8 Ainslie Place,	1865
	* Dr Kirk Duncanson, 22 Drumsheugh Gardens,	1870
45	** Dr Dunsmure, 53 Queen Street,	1841
	* Dr J. Dunsmure, jun., 53 Queen Street,	1872
	C. H. Fasson, Esq., Dep. Surg.-Gen., Royal Infirmary,	1879
	* Dr Finlay, St Colms, Lennox Row,	1847
	* Dr W. A. Finlay, St Helens, Russell Place,	1874
50	Dr Andrew Fleming, 8 Napier Road,	1880
	* Dr Foulis, 34 Heriot Row,	1875
	Dr John Fraser, 31 Regent Terrace,	1879
	* Professor Thomas R. Fraser, 37 Melville Street, *Vice-President*,	1865
	Dr R. Freeland, Broxburn,	1879
55	** Professor W. T. Gairdner, M.D., 225 St Vincent St., Glasgow,	1848
	* Dr Garland, 35 Charlotte Street, Leith,	1873
	Dr G. A. Gibson, 1 Randolph Cliff,	1881
	* Dr James D. Gillespie, 10 Walker Street,	1850
	* G. R. Gilruth, Esq., 67 York Place,	1850
60	** Dr Gordon, 23 George Square,	1848
	Dr J. Allan Gray, 32 Madeira Street, Leith,	1879
	Dr Greig, 38 Coates Gardens,	1854
	* Dr C. H. Groves, Forthland House, York Road,	1867
	* Dr Haldane, 22 Charlotte Square,	1853
65	* Professor D. J. Hamilton, University of Aberdeen,	1876
	* Dr John Henderson, 7 John's Place, Leith,	1848
	Dr James Hunter, 18 Abercromby Place,	1850
	* Dr Husband, 28 Clarence Street,	1850
	Francis B. Imlach, Esq., 48 Queen Street,	1843
70	Dr Archibald Inglis, 33 Albany Street,	1827

		Date of Admission.
	Dr James, 11 Albyn Place,	1877
	* Dr W. Allan Jamieson, 26 Rutland Street,	1876
	James Jamieson, Esq., 6 Buccleuch Place,	1877
	Dr Kalley, 9 Tipperlin Road,	1860
75	** Dr Keiller, 21 Queen Street,	1845
	* Dr Thomas Keith, 2 North Charlotte Street,	1852
	Dr Robert Lawson, 33 Grange Loan,	1881
	* Dr Linton, 60 George Square,	1863
	* Dr Littlejohn, 24 Royal Circus,	1853
80	Dr Thompson Lowne, 46 Minto Street,	1851
	* Dr Lucas, Dalkeith,	1875
	Dr P. M'Bride, 16 Chester Street,	1879
	* Dr Angus Macdonald, 29 Charlotte Square,	1866
	Dr G. Mackay, 2A Gilmore Place,	1878
85	* John M'Gibbon, Esq., 55 Queen Street,	1868
	Dr MacGillivray, 11 Rutland Street, *Secretary*,	1877
	** Professor Maclagan, 28 Heriot Row,	1834
	* Dr P. H. Maclaren, 1 Drumsheugh Gardens,	1868
	Dr A. Matthew, Corstorphine,	1882
90	Dr D. Menzies, 3 Lothian Road,	1878
	* Dr W. Menzies, 3 Lothian Road,	1847
	* A. G. Miller, Esq., 11 Walker Street, *Treasurer*,	1866
	* Dr Arthur Mitchell, 34 Drummond Place,	1859
	* Dr Moinet, 13 Alva Street,	1870
95	* Dr Moir, 52 Castle Street,	1836
	Alexander Moir, Esq., 30 Buccleuch Place,	1876
	* Dr Claud Muirhead, 30 Charlotte Square,	1866
	* Dr Niven, 110 Lauriston Place,	1845
	Dr P. Orphoot, 113 George Street,	1865
100	* Dr Robert Paterson, 61 Charlotte Street, Leith,	1847
	Dr Paterson, 15 Merchiston Park,	1837
	* Dr Pattison, 26 London Street,	1842
	* Dr Peddie, 15 Rutland Street,	1842
	Dr J. A. Philip, Mavisbank, Loanhead,	1878
105	* Dr Playfair, 25 Rutland Street,	1874
	* J. D. Pridie, Esq., 6 Minto Street,	1857
	Dr Rattray, Portobello,	1874
	* Dr Renton, 15 Rothesay Place,	
	* Dr James Ritchie, 10 Northumberland Street,	1873
110	* Dr R. Peel Ritchie, 1 Melville Crescent,	1861
	* Dr Argyll Robertson, 18 Charlotte Square,	1861
	* Professor Rutherford, 14 Douglas Crescent,	1874
	Dr Ronaldson, 18 Bruntsfield Place,	1877
	Dr John Shand, 34 Albany Street,	1878
115	C. H. E. Sheaf, Esq., Barrow-in-Furness,	1871
	* Dr J Sibbald, 3 St Margaret's Road,	1858
	** Dr James Sidey, 20 Heriot Row,	1849
	* Professor Simpson, 52 Queen Street, *Vice-President*,	1857
	* Dr A. J. Sinclair, 48 Northumberland Street,	1873
120	* Dr Andrew Smart, 14 Charlotte Square,	1864
	* Dr J. Alex. Smith, 10 Palmerston Place,	1853
	Dr G. D. Smith, 59 Ferry Road, Leith,	1877
	* Dr John Smith, 11 Wemyss Place,	1856
	Dr T. F. H. Spence, 21A Ainslie Place,	1881
125	* Professor Grainger Stewart, 19 Charlotte Square,	1860
	Dr W. Stewart, Kirkwall,	1879
	* Dr James Struthers, 39 Charlotte Street, Leith,	1849
	Professor John Struthers, M.D., Migvie House, Aberdeen,	1847
	Dr Johnson Symington, 10 Warrender Park Crescent,	1878
130	* Dr W. Taylor, 12 Melville Street,	1870
	* C. H. Thatcher, Esq., 13 Albany Street,	1876
	Dr Alexander Thomson, 14 Rankeillor Street,	1849

		Date of Admission.
	* Dr Batty Tuke, 20 Charlotte Square,	1854
	Dr J. Rutherford Turnbull, 29 Castle Terrace,	1869
135	* Professor Turner, 6 Eton Terrace,	1858
	* Dr Underhill, 8 Coates Crescent,	1872
	William Walker, Esq., 47 Northumberland Street,	1841
	B. C. Waller, Esq., M.B., 15 Lonsdale Terrace,	1877
	Dr P. H. Watson, 16 Charlotte Square,	1856
140	Dr W. Watson, Midcalder,	1862
	* Dr Graham Weir, 36 Heriot Row,	1837
	* Dr Williamson, 28 Charlotte Street, Leith,	1849
	* Dr Charles Wilson, 7 Dalrymple Crescent,	1854
	* Dr David Wilson, 12 Dean Terrace,	1844
145	Dr James Wilson, Meadowbank,	1872
	Dr T. D. Wilson, 8 St Vincent Street,	1880
	Dr Strethill Wright, 17 Alexander Road, Southport,	1871
	* Dr Wyllie, 1 Melville Street,	1868
	* Dr James Young, 14 Ainslie Place,	1858
150	* Dr P. A. Young, Portobello,	1870
	* Dr Zeigler, 47 George Square,	1876

NON-RESIDENT.

	Dr Lauchlan Aitken, *Rome*,	1868
	Dr J. J. Bailey, *Marple, Cheshire*,	1874
	Dr F. W. Barry, *Nicosia, Cyprus*,	
155	Dr Benbow, *Uxbridge*,	1857
	Dr Bethune, *Toronto*,	1861
	Dr James S. Beveridge, *London*,	1861
	Dr J. W. Black, *London*,	1865
	Dr Blackie, *United States*,	1856
160	Dr Brodie, *Liberton*,	
	W. A. F. Browne, Esq., *Dumfries*,	1858
	Surgeon-Major F. S. B. F. de Chaumont, *Netley*,	1876
	Professor Cleland, *Glasgow*,	1864
	Dr Cobbold, *London*,	1861
165	Dr Coghill, *Ventnor*,	1870
	Dr Connel. *Peebles*,	1876
	Dr P. M. Deas, *Macclesfield*,	1868
	** Dr Matthews Duncan, *London*,	1849
	Dr W. B. Dow, *Dunfermline*,	1879
170	Dr Drummond, *Nice*,	1852
	E. W. Duffin, Esq., *London*,	
	Dr J. W. Eastwood, *Darlington*,	1871
	Dr A. Ferguson, *Peebles*,	1882
	Dr R. B. Finlay, *Middle Temple, London*,	1864
175	Dr Foulis, *Cupar-Fife*,	1859
	Dr Fowler, *London*,	1847
	* Professor Gamgee, *Manchester*,	1863
	Peter Gordon, Esq., *Juniper Green*,	1861
	Dr A. Graham, R.N.,	1853
180	Dr Groesbeck, *Cincinnati*,	1875
	Dr Gunning, *Brazil*,	1854
	Dr Archibald Hall, *Montreal*,	1853
	R. S. Harvey, Esq., *Lincoln*,	1849
	Dr J. H. Hay, *Alloa*,	1880
185	Dr Stanley Haynes, *Malvern*,	1864
	Dr J. S. Howden, *Montrose*,	1856
	Dr Hunter, *Linlithgow*,	1877
	Dr T. Inglis, *Lincoln*,	1878
	Dr Irving, Dep. Surg.-Gen. *Bengal Army*,	1846
190	Dr Joseph Johnson, *Bombay*,	1844

		Date of Admission.
	Dr James Johnston, *Shanghai*,	1871
	Dr George Keith, *Currie*,	1845
	Dr T. M. Lee, *India*,	1846
	Dr George Leslie, *Larbert*,	1881
195	* Joseph Lister, Esq., *London*,	1855
	Dr R. Little, *Singapore*,	1859
	Dr F. Lockwood Logan, *Adelaide*,	1864
	Dr Lowe, *London*,	1854
	Dr F. R. Macdonald, *Inveraray*,	1859
200	Dr K. N. Macdonald, *Cupar-Fife*,	1880
	Dr John A. Macdougall, *Carlisle*,	1875
	Dr A. J. Macgregor, *Glasgow*,	1865
	* Professor M'Kendrick, *Glasgow*,	1870
	Dr John Mackay, *Aberfeldy*,	1881
205	Dr W. O. Mackenzie, D.I.G.H., *London*,	1845
	Dr T. J. Maclagan, *London*,	1875
	Dr J. Moolman, *Cape of Good Hope*,	1877
	Dr J. Ivor Murray, *China*,	1857
	Dr Andrew Myrtle, *Harrogate*,	1858
210	Dr Leith Napier, *Dunbar*,	1879
	Dr Phillippo, *Kingstown, Jamaica*,	1860
	Professor W. S. Playfair, *London*,	1857
	Dr Priestley, *London*,	1854
	Professor Bell Pettigrew, *St Andrews*,	1873
215	Thomas Sheriff, Esq., *Ratho*,	1867
	Dr Sinclair,	1850
	Dr Francis Skae, *Lerwick*,	1864
	Dr T. Skinner, *London*,	1856
	Dr George Smith, *Madras*,	
220	Dr John Smith,	1873
	Dr Van Someren, *Madras*,	1845
	Dr Somerville, *Galashiels*,	1877
	Dr Graham Steell, *Manchester*,	1877
	Dr H. R. Storer, *Newport, Rhode Island, U.S.*,	1855
225	* Professor Stephenson, *Aberdeen*,	1861
	Lawson Tait, Esq., *Birmingham*,	1870
	Dr Thin, *London*,	1861
	* Dr Allen Thomson, *London*,	1841
	John Trail, Esq., *Arbroath*,	1853
230	Dr R. S. Turner, *Keith*,	1867
	Dr Turnour, *Denbigh*,	1843
	Dr T. S. Watson, *Bath*,	1852
	Dr W. Watson, *Montrose*,	1863
	Dr Walter Weir, *London*,	1879
235	Dr Yellowlees, *Gartnavel Asylum, Glasgow*,	1862
	Professor John Young, *Glasgow*,	1859

N.B.—*Members are requested to communicate with the Secretaries if they discover any errors or omissions in the List, and also to intimate all changes in their addresses.*

CONTENTS.

I.—ORIGINAL COMMUNICATIONS.

(*a.*) General.

(*b.*) Anatomical.

(*c.*) Medical.

(1.) *General Diseases.*

(2.) *Diseases of the Heart.*

(3.) *Diseases of the Kidneys.*

(4.) *Acute Infectious Diseases.*

(5.) *Mental Diseases.*

II.—EXHIBITION OF PATIENTS.

(5.) *Illustrating Diseases of the Extremities.*

III.—EXHIBITION OF PATHOLOGICAL SPECIMENS.

(1.) *Illustrating Affections of the Head, Neck, and Thorax.*

(2.) *Illustrating Affections of the Intestines.*

(3.) *Illustrating Affections of the Genito-Urinary System.*

(4.) *Illustrating Affections of the Joints.*

IV.—EXHIBITION OF MISCELLANEOUS OBJECTS.

(1.) *Foreign Bodies Removed.*

(2.) *Mechanical Instruments and Surgical Dressings.*

(3.) *Casts, Tracings, Drawings, and Photographs.*

(4.) *Microscopic Demonstrations.*

TRANSACTIONS

OF

THE MEDICO-CHIRURGICAL SOCIETY OF EDINBURGH,

FOR SESSION LXI., 1881–82.

Meeting I.—November 2, 1881.

Dr P. Heron Watson, *President, in the Chair.*

I. *Dr Coldstream* showed the TRACHEA and LARYNX of a child on whom he had operated the previous week. The patient was a little boy æt. 2, suffering from well-marked diphtheria. Patches on tonsil and uvula were to be seen from the mouth. When the doctor first saw him he was in a state of suffocation. The operation was performed at once, with great relief. The patient survived three days, dying ultimately of blood-poisoning. In the preparation the œsophagus was dissected off and the trachea slit open posteriorly. In the front wall the tracheotomy wound was well seen, and below it a piece of false membrane. This piece of membrane made a complete circle round the trachea, and extended down as far as the bifurcation.

II. *Mr Joseph Bell* showed (1) a LOOSE CARTILAGE removed from the knee-joint of a Danish sailor the previous day. He ventured to bring it before the Society in order to mention the method adopted to fix the body for operation. The patient had had a smart attack of synovitis. When it went down the loose body was discovered, but it was so mobile that the attempts made to catch it were very often futile. To prevent it slipping into the interior of the joint the very simple plan of transfixing it by means of a long carbolized straight needle was adopted. It was thus kept in position on the inner side of the joint, and there cut down on. The operation was done under strict antiseptic precautions,

and, so far, the patient was doing extremely well. He also showed (2) an interesting CAST taken from a case of very great rarity. He had been asked to see a young man suffering from an injury to his shoulder. With the patient there was an old gentleman who, Mr Bell noticed, had a deformed hand, of which he was a little ashamed, for he endeavoured as well as he could to conceal it. With a little persuasion he got him to submit to having a cast taken, and it was now before them. It showed the right hand dislocated towards the radial side, the lower end of the ulna projecting about half way along the ulnar side of the metacarpus, and the radial side of the forearm, especially in its lower half, greatly shrunken. The hand had been injured some four years previously, and seemed to have been treated by a bone-setter. So far as could be made out, the injury appeared to have been a Colles' fracture slightly higher up than usual. The upper portion of the radius was very much wasted, and passed off into quite a thin piece of bone, attached to the lower fragment only by membrane. The Italian who took the cast had bulged the muscles too much to the radial side, giving a somewhat incorrect impression. A leathern case was being made for the arm, which it was hoped would support it and allow the tendons (flexor and extensor) to act on the fingers, rather than on the hand, as they did at present.

III. *Dr James Carmichael* exhibited several TUMOURS, ranging in size from a pea to a bean, removed from the brain of a little boy aged $2\frac{1}{2}$ years. The patient was brought to the Royal Hospital for Sick Children, suffering from vomiting of an intermittent character. This subsequently, after a few weeks' treatment, disappeared altogether, and did not recur. The child was very much wasted, and the emaciation progressively increased until his death about five months after. An examination of the child was attended by negative results as regards the detection of any physical signs of disease of internal organs; and although the case was under continuous and careful observation until the time of the child's death, nothing of a positive nature in regard to the evidence of disease could be made out. The previous history of the case, however, seemed to give a clue to the cause of the steady wasting which was going on. It appeared that the child was quite healthy until the age of eighteen months, when, along with the other children in the family, he suffered from an attack of measles, and had never enjoyed good health thereafter. I was therefore led to form the opinion that the child suffered from hyperplasia followed by caseation of the tracheo-bronchial glands, as a sequela of measles, and this succeeded by tuberculosis. The correctness of the diagnosis was verified by the child ultimately showing symptoms of meningitis, which proved fatal on the fifth day. On post-mortem examination the bronchial

glands were found caseous, and a few of the mesenteric glands were in a similar condition; there was also tubercle in the lungs, liver, and peritoneum. The brain was carefully examined, and it was found that the subarachnoid space was œdematous, the ventricles filled with fluid, and abundant sero-purulent lymph was seen at the base, filling up the interpeduncular space and its neighbourhood. In addition, the tumours now exhibited were found embedded in the gray substance of the hemispheres. They were altogether nine in number, five on the right side, in the ascending frontal and parietal lobes, two in the occipital lobe, on the left side, and two on the right occipital lobe, closely adherent to the dura mater (tentorium) of the cerebellum. The tumours appeared to originate from or follow the course of the vessels of the pia mater. They lay quite isolated and circumscribed in the gray substance. On examination they were of roundish form and firm consistence, and, on section, commencing softening in the centre could be seen. Microscopically, they presented all the characteristic appearances of tubercle, with numerous giant cells scattered throughout.

IV. *Mr Joseph Bell* read his paper entitled

NOTE ON RUPTURE OF THE URETHRA, AND ITS TREATMENT.

Rupture of the urethra is a surgical complication which, resulting from very varied causes and in very different conditions of local and general health, varies much in individual cases both in risk and severity, and is to be treated under equally varied principles.

Having had a large number of such cases under my care, both in hospital and in consultation, I have been led to classify them, for my own guidance, into three great classes, to one of which I am very briefly to direct your attention this evening.

The three varieties are:—

1. Rupture behind a stricture of old standing, with a bladder contracted as to its lumen, and hypertrophied as to its muscular coat, acting with force on a urethra dilated behind a nearly impermeable stricture, and probably with coats thinned, sodden, possibly even ulcerated, from contact with putrid alkaline urine. These cases, being ruptured in the act of attempted micturition, are at once followed by urinary extravasation, destruction to the cellular tissue from the irritating nature of the urine, and are apt to be followed by rapid gangrene of scrotum and penis, extremely severe constitutional symptoms, and death, unless speedily treated by free incisions. Such cases are sadly common and too well known.

2. Rupture may occur in a perfectly healthy individual from an injury to the perinæum, unattended by fracture of pelvis or any other complication whatever. For example, a dragoon is thrown

violently forward on the pommel of his saddle or on the dorsal spines of a bony old horse. A sailor, missing his hold of a rope, falls astride of a yard. A prostrate drunkard gets a kick in the back from a heavy-booted friend. Such accidents are heralded by hæmorrhage from the urethra, which is actually cut through by its forcible impact against the triangular ligament and edge of pubis. Extravasation of urine and blood may occur, which free central incisions will relieve. The case will generally recover with a urethra permanently damaged, and certain to be affected by a most severe and intractable form of stricture of the membranous portion, which, though limited in its length, is very tight and sure to recur again and again. Of these I have nothing new to say, but only to state that experience has taught me to avoid cutting and splitting or any other fresh traumatisms, and to trust implicitly to patient, gradual, and constant dilatation.

3. The third form of rupture of urethra is that so well known in mining or quarry districts, in which a fall of coal or stone on the pelvis, or a heavy waggon going over the patient, has resulted in one or other of the following conditions, which I have frequently seen and dissected—either (*a*) a multiple fracture of pelvis, generally of rami of pubis and ischium; or (*b*) a fracture of pubis, with partial separation of sacro-iliac synchondrosis; or (*c*) one or more fractures in vicinity of hip-joint, with separation of pubic symphysis. All varieties are very apt to be followed by a rupture of urethra in some place, as in No. 2, but having the far graver complication, *i.e., that it is caused by and in immediate relation to a fracture of pelvis and a consequent laceration of pelvic fascia.*

Now see what happens in such a case. The patient tries to make water; blood alone comes, or comes first, and he may make a few drops. The doctor tries to relieve him, probably does not succeed, and, with his catheter moving about in a most tantalizing apparent cavity, drains off only the blood and urine effused into the cellular tissue. Next day the perinæum is swollen and black; incisions must be made, and now you have a compound fracture of pelvis, probably more than one; and, almost as bad, you have admitted air into the cavity, full of blood and urine, communicating with the interior of the pelvis. Your incisions will relieve tension and let the blood and urine drain out, but it will be within the experience of every surgeon here that such cases, with all your care, prove very serious and too often die. I read brief notes of a typical one from a very common cause.

John Cullen, æt. 23, residing at Tranent, was admitted to Ward XII., Royal Edinburgh Infirmary, on March 29, 1881, suffering from the effects of an accident received in a pit on the previous day.

History.—Patient's duty in the pit was to stand at the bottom of an incline, to unload trucks of coal coming down, and return them empty. About 12 A.M. the man at the top of the incline

allowed a truck to run down without warning Cullen to receive it. This truck struck an empty one behind which Cullen was standing, and before he could get out of the way he was jammed between it and the wall. He was at once picked up, taken home, and seen by Dr Furley of Tranent. The patient complained of an inability to pass water, and after two or three trials the doctor succeeded in drawing off a small quantity of blood-stained urine. Next day he told Cullen's father that the "main-pipe" to the bladder was torn, that the urine was passing through his system, and that he would be better in the Infirmary.

On admission, penis, scrotum, and perinæum were swollen and discoloured, purple in some places, black in others. Patient at once expressed a wish to have his water taken off, and after a few trials a catheter was passed into a cavity, from which a small quantity of blood-stained fluid was drawn off.

The case was puzzling. My house-surgeon was not satisfied that the catheter was in the bladder, but left it in and made incisions into the infiltrated tissues, and then sent for me. When I came I found that the catheter was in a cavity between the bladder and rectum, but not in the bladder itself. It could not be passed into the bladder. I therefore incised the perinæum deeply in the middle line, and withdrew the catheter. On incising, a fracture of the os pubis on the right side could be made out. Some urine and blood flowed, but not very freely. The bladder was therefore aspirated, and 20 oz. of apparently normal urine (not blood-stained) taken off. Hot fomentations were put to the perinæum to encourage the flow of urine outwards.

During the night he was very restless, but did not complain of pain. Chloral and bromide of potassium were given very freely, but without much effect, till the early morning. The urine never flowed very freely, and once a day, while he lived, the bladder required aspiration. For some days he continued to improve. He was very restless and troublesome at first, but in a few days he became quieter. On the night of the 4th April, while the nurse was attending to another case at the other end of the ward, he made an attempt to get out of bed. He suddenly became very faint, and in a few minutes died, apparently of internal hæmorrhage.

Post-mortem Examination.—There were several incisions in the scrotum, and one two inches long in the perinæum. There were marks of extravasated blood in the iliac and inguinal regions, especially in the left iliac, also on the left buttock, and there was at this part a feeling of some gas under the skin. There was a similar circumscribed extravasation of blood just over the sacrum. On the abdomen being opened a large quantity of blood was found lying behind the peritoneum in its lower two-thirds. The urethra was torn across nearly opposite the triangular ligament, and a large cavity was formed in the perinæum opposite the lacera-

tion. The right cartilage of the symphysis pubis was separated from the bone. Right symphysis was totally dislocated and displaced backwards. Round about there was a large amount of extravasated blood, probably due to rupture of the pudic artery. There was a complete separation of the right sacro-iliac synchondrosis, and around it a large amount of recently extravasated blood (probably from injury of the iliac vessels).

Another I saw in consultation not long ago. A powerful, healthy, and temperate young farmer was returning home late on a very frosty night on horseback. His horse was startled, left the road, leapt on to the parapet of a low stone bridge, and fell, with its master still on its back, into the river-bed. He was badly hurt, carried home, passed blood, and no water; had his water drawn off easily enough, and at stated intervals, by his own doctor, Dr Watson of Midcalder. As in a few days he was evidently in high fever and apparently dying, I was sent for.

He was lying on his back, patient and not easily roused, with a jaundiced skin and high pulse and temperature; with frequent rigors, no appetite, and extremely weak; evidently in last stage of septicæmia. The bladder contained a fair amount of urine, which could be readily drawn off. The perinæum and scrotum were dark from bruising, but showed no evidence of infiltration. His left foot was everted, and gave pain on movements. His left thigh, especially the abductor region, was enormously thickened and swollen, and of a brawny hardness. It was obvious what had happened. An extensive and much displaced fracture of the pelvis, specially of left pubic bone, had resulted from fall, and the urinary extravasation which had occurred during his first efforts to pass water had extended, *not into perinæum, and then, as usual,* into scrotum and upon abdomen, but at once from pelvic fascia, through the rents in it caused by fracture, into the deep intermuscular septa of the thigh. I verified this by a deep incision, first through fascia lata, and then, separating adductor muscles with my fingers, got a large quantity of urine, blood, and dead cellular tissue out of the thigh. This relieved tension and gave temporary relief, but was too late to save the poor lad's life. I felt the fractured portion of pubis from my wound.

Now, is there any method by which, in such cases, we can prevent these sad results? I believe there is, if the case is seen early enough, by the enforcement of a very simple, easily remembered rule, *never to allow a single drop of water to pass the sphincter vesicæ into the injured urethra for at least ten days.* If this can be managed,—and I believe it can be done quickly, safely, and pleasantly,—then there is no fear of putrescence of the blood-clot round the fractured pelvis. It remains a simple—is not made into a compound—fracture, the lacerated urethra is given physiological rest, no incisions need be made into its wall, and hence less risk of subsequent stricture will ensue.

How is this to be done?

At once, on recognising the accident, do not allow the patient to try to pass water: he will be glad to escape the pain. Do not work away with a catheter on the injured urethra, but at once tap the bladder above the pubis with the fine needle of the aspirator, pump out the water, and repeat this every eight or twelve hours, according to circumstances, for at least ten days. It is easy, far easier than an ordinary catheterization. It is safe: I have seen it done forty times in a space that a florin would cover, without a bad symptom. It is pleasant: just ask the patient, and he will tell you how much less unpleasant it is than a catheter. It may be said, How is a country doctor to manage it, with all his calls and hard work? Well, to this I answer, It need not be done more frequently than the catheter needs to be passed; and if he cannot do it twice a day, then I would say, tap the bladder per rectum, leave in a Cock's trocar,—anything better than let any urine into and out of the injured urethra.

The following case is a typically perfect example of what I hope may soon be *the* treatment of such cases:—

T. G., æt. 27, admitted to my Ward XII. on July 8th, 1881, a miner, was lying on his left side in a pit, when three tons of coal fell from roof on his chest and pelvis. He was released at once, sent home, and brought into the Infirmary, which he reached seven hours after the accident. Four ribs were broken, and pelvis was fractured. He had passed no water, and as he required relief, my house-surgeon, Dr Ross, tried to pass a soft catheter and failed, drawing blood only. As he knew it would be nearly an hour before I could see the patient, and the case was urgent, he aspirated the bladder at once, with great relief, and did not allow patient to make any effort to relieve himself. I saw him, and recommended that this should be continued at regular intervals. On eighth day I passed a small flexible catheter, on thirteenth a No. 5 silver, which I tied in for thirty-two hours. After this he passed water himself easily and at proper intervals, and before he went out I could pass a No. 12 easily. The patient had never a single bad symptom, though the case was one of the very worst of the kind I have ever seen.

The rule is a simple one, easily remembered, and the treatment is equally easy. I trust it may commend itself to the members of the Society.

Mr Duncan said the paper was not one lending itself easily to criticism. It was a subject on which they must all have felt they had some experience in reference to the disastrous results that so often occurred. Those cases to which Mr Bell more particularly referred—fracture of the pelvis accompanied by rupture of the urethra—were by no means rare. They were not all necessarily followed by extravasation of urine. Within the last year he

had had two cases under his care in the Infirmary in which there was undoubted fracture of the pelvis with rupture of the urethra, and in neither did extravasation of urine occur. When it was necessary to make an incision into the perinæum, he agreed with Mr Bell that the case often ended disastrously; but if the urine could be drawn off for a short time, usually two or three days, in his experience then the case goes on well. In cases where the catheter could not be passed he thought the treatment recommended by Mr Bell was admirable. Aspiration gave a chance of keeping the urine in its aseptic condition. It was well worth an extended trial. They must, however, take care to see that the aspirator was thoroughly clean. This was a point perhaps not sufficiently attended to. A case occurred to him the other day in which he had to aspirate a highly septic abdomen connected with a gangrenous condition. He then proceeded to the next ward, telling the dresser to bring the aspirator, after it was cleaned, for use in a case of abscess connected with the hip. This abscess had been aspirated twice previously with very good effects, but after the third aspiration the temperature rose, and bacteria and micrococci appeared in the pus. An incision brought the temperature down; but the non-success of the third aspiration was due to the fact that the aspirator had only been superficially cleaned.

Dr Cotterill wished to ask Mr Bell one or two questions. He wished to know if he was correct in understanding him to say that rupture of the pelvic fascia was not commonly met with except in cases where there was fracture of the pelvic bones. He thought it was sometimes the case that the deep pelvic fascia was ruptured without fracture. He would also ask if it was right to take for granted that the patient had not passed water in those cases where Mr Bell recommended aspiration. There was a great shock to the system at the moment of the accident, and in a state of shock the patient often passed water unconsciously. If he did so, there was, in all probability, extravasation of urine, and he would ask if it was fair that the patient should be allowed to die of pyæmia from the extensive sloughing of tissues that would take place where no incision was made.

Mr Duncan remarked that it was an interesting point to consider whether a small extravasation of urine would do any harm. His own impression was that it would not, unless it became septic. It was undoubtedly a chemical irritant, but it was when it became decomposed that the most aggravated cases of sloughing occurred.

Mr Symington would like to know Mr Bell's opinion as to the position where rupture most commonly occurred in patients falling on joists, etc. Few of the text-books were precise on this point. He had not much practical experience of these cases, but he remembered one which occurred to him when he was a house-surgeon, in which he passed a catheter with the result of drawing off

a large quantity of blood from a cavity which extended a long way up between the bladder and rectum. In the majority of cases where the patient fell on a joist, he was of opinion, from his anatomical investigations, that the rupture occurred in the bulbous, and not in the membranous portion of the urethra. If the bulbous portion alone were ruptured, the urine would take the orthodox course described in the text-books. He believed that there was not only a rupture of the urethra, but also a rupture of the deep pelvic fasciæ or layers of the triangular ligament. The urine would not then take the typical course, and he thought it would be well to attend to this, as both extravasated blood and urine were apt to burrow deeply round the sides of the rectum and bladder.

Mr Bell was afraid that the shortness of his paper had prevented him making it thoroughly clear to Dr Cotterill. Rupture of the pelvic fasciæ might certainly occur without fracture of the pelvis, but he referred especially to cases where the rupture was extensive and accompanied by rupture of the urethra. He agreed with what Mr Duncan said regarding the effects of extravasated urine. He did not wish to push his method of treatment by aspiration in cases where a catheter could be passed. He only recommended its adoption in cases where the surgeon failed to pass the instrument. He was much interested in what Mr Symington had said regarding the position of the rupture. His own experience was purely practical, and he thought the seat of rupture depended a good deal on the position of the patient when he received the injury. In most cases he had seen the extravasated urine taking the typical course.

V. *Dr Cadell* read the following paper on

THE TREATMENT OF SYPHILIS.

Before describing the method I adopt in treating syphilis, it is necessary to consider the state of medical opinion upon the subject. Since syphilis has been recognised as a disease, mercury has been trusted to as the chief remedy. In the present day mercury has been called by some a vital antidote to the syphilitic poison. Dr Farquharson, in a recent work on therapeutics, says of mercury in its relation to syphilis, that "it may be considered a specific, or at least a vital antidote." It is a source of wonder to me how medical authors can use such vague phrases regarding drugs, when no such thing is at present known as an antidote to a vital poison. When on this subject I will quote Sir Joseph Fayrer's conclusions regarding the probability of finding an antidote for snake poison. He says, "To conceive of an antidote, in the true sense of the term, to snake poison, one must imagine a substance so subtle as to follow, overtake, and neutralize the venom

in the blood, or that shall have the power of counteracting or neutralizing the deadly influence it has exerted on the vital forces. Such a substance has still to be found, and our present experience of the action of drugs does not lead to hopeful anticipation that we shall find it." What Sir Joseph Fayrer says of one vital poison we may say of the syphilitic poison, that no antidote has been found for it, and there is little prospect of such a discovery.

But it is the fashion at present to call the old treatment of syphilis by mercury a tonic treatment, and so sink the idea of its having a specific character.

Mercury is now said to have the effect of increasing the red corpuscles of the blood, and thus benefiting the anæmic condition found in syphilis. Mercury, however, does not increase the red corpuscles in non-syphilitic anæmia; so that if it does so in syphilitic anæmia, it must be by a specific action on the poison. This, I hold, there is no evidence for believing.

In the so-called tonic treatment mercury is given with the utmost precaution. Even its physiological action is deprecated, care being taken, by means of astringent mouth-washes, to prevent the gums getting sore. A minute dose is given in a guarding tonic vehicle, and the most careful local and hygienic treatment employed, and this is continued for from two to four years. In Mr Lane's *Lectures on Syphilis*, second edition, published this year, 1881, although a staunch believer in the efficacy of the mercurial treatment, he makes the following extraordinary statement regarding it. "There are," he says, "two classes of patients in which the abstention from mercury may be advisable: first, those who are in sound health and capable of throwing off the morbid influence without assistance; and, secondly, those in broken-down health, or in whom there is an evident strumous or consumptive tendency, which may render it desirable, if possible, to dispense with a mercurial course." The patients in the first class have to do without the benefits of mercury because they are too strong to require it; those in the second class have to do without it because they are too weak to stand it. The poor debilitated creatures in the second class have peculiarly hard measure meted out to them. Suffering from syphilis, they are now in a position to have their thin blood transformed into a healthy fluid by that wonderful red corpuscle manufacturer and specific tonic, mercury. But just because this class of patients require all the assistance drugs can give them to enable their debilitated frames to throw off the syphilitic poison, Mr Lane denies them the benefits of the drug which is still most widely approved of for the cure of their disease. This seems to me a thoroughly illogical position for mercurialists to hold. If mercury is good for anything, it ought to do most good where a remedy is chiefly required, and that is among the weak and feeble.

When beginning practice in Edinburgh, now nearly twelve years ago, I was led to discard mercury in the treatment of syphilis from

the experience I obtained of the non-mercurial treatment while watching the practice of Professor Boeck and others who did not believe in the specific action of mercury. Since then I have steadily practised the non-specific treatment of syphilis, and, by watching the course of many cases for a length of time, have come to the conclusion that it is the best method, and the one least likely to be followed by gummatous complications. Believing that the anæmic state of the blood and the depressed condition of the vital powers (which certainly occur during the course of syphilis) can be quite safely combated without mercury, I have trusted entirely, in the treatment of this disease, to the blood-forming and tonic medicines which are found useful in similar conditions of the body in other diseases.

I shall now, as briefly as possible, describe the treatment adopted.

Syphilitic Chancre.—Whatever be the amount of induration or ulceration connected with this sore, the treatment of it should be conducted on ordinary surgical principles. No mercury is required either internally or externally, and the sore will be found to behave very much the same as other ulcers do under similar conditions when submitted to rational treatment. Caustics are rarely necessary, and should only be applied when they will assist the process of healing, and not under the expectation that even in the earliest stage of the chancre they may ward off constitutional infection. I hold with Ricord that the appearance of the chancre is the first indication that the blood is contaminated by the syphilitic virus. When it is considered necessary to apply nitric acid for surgical reasons, a plan has been suggested by Dr Keyes of placing first a drop of pure carbolic acid on the sore, and then drying the surface with blotting-paper, before applying the stronger acid, the well-known anæsthetic properties of carbolic acid making the subsequent application less painful. There is an attempt at present to resuscitate the treatment by excision of the chancre, in order to prevent constitutional infection. This practice has not been found successful, for reasons stated above when speaking of cauterization. Water dressing or any of the ordinary astringent lotions may be applied according to indications. Boracic ointment and iodoform are also useful applications, more especially the latter. It is best to apply iodoform in powder, and if it were not for its persistent smell it would be very generally applicable. The addition of tannin has been recommended to lessen the smell of iodoform, but it makes little difference. By these simple means the worst forms of chancre will heal, although it may be necessary also to give tonics to improve the condition of the patient, when that is required.

In the lymphatic engorgement which accompanies the syphilitic chancre, suppuration is rare, and even when it seems most imminent it is well to refrain from using the knife, as it is often astonishing how resolution may take place even when fluctuation is seemingly distinctly felt.

In a case of indurated chancre with multiple adenopathy it is necessary at once to consider how best to prepare the patient to resist the depressing effects of advancing constitutional syphilis. He must be warned that in order to get well over this tedious and often severe illness, a high state of bodily health has to be maintained, the most scrupulous cleanliness practised, to keep regular hours, eat plainly, take stimulants in very moderate quantities and only with his meals, and to give up the use of tobacco absolutely in all its forms. The state of the mouth should be carefully attended to in order that no local source of irritation to the mucous membrane may be allowed to exist. Among some of the first symptoms of constitutional syphilis, appearing often before any skin eruption, are periosteal swellings and bone pains of a more or less transient character, the pains being worst at night, and having a tendency to subside on the development of the skin eruption. For these symptoms iodide of potass in gr. x. doses is useful, but only as directed against the bone and periosteal symptoms, and not as having any special reference to this the so-called secondary stage of syphilis. I believe iodide of potass to be practically useless for the relief of any symptoms occurring during the secondary stage, except those above referred to.

After these preliminary symptoms, which are not constant, come the eruptions of the skin and mucous membrane, falling off of the hair, affections of the nails, eye, etc.

There is now invariably a tendency to anæmia, with depression of vital power, and to obviate these conditions is the chief aim of treatment.

At this stage, and often before, mercurialists begin their specific treatment, and the most eminent advocates of the method recommend that it should be continued without intermission for two years at least. It may be of interest to give here shortly the views of Bärensprung on the advantages of the non-mercurial over the mercurial treatment. Although formerly a strong mercurialist, he raised his voice in Berlin against the system. He believed that mercury caused the secondary manifestations to disappear, but did not hinder the further development of the syphilitic process. The outbreak of new symptoms is hindered, and in this way the course of the disease is prolonged. Bärensprung further asserts that, syphilis being a deep-seated disease of the whole organism, cases of rapid recovery under a few weeks are of rare occurrence, whatever the treatment may be. As a rule, recovery is very gradual, and may follow either mercurial or non-mercurial treatment. The advantage secured by the first is the rapid disappearance of the several symptoms of the disease; but this is more than counterbalanced by a double disadvantage, for, as mercury has an undermining effect on the entire constitution, the development of local disorganizations is favoured; and as the disease often for months and years remains latent, the ultimate recovery is protracted.

The difficulty of the non-mercurial treatment is increased, especially at the commencement of the disease, by the severe and diffuse manifestations of symptoms not being hindered, and these symptoms being only slowly made to disappear; but, in return, it holds out the great advantage that the disease never remains concealed when it is not cured, and the ultimate recovery is at anyrate advanced. This is a fair statement of the position of the non-mercurialists. Any influence mercury may possess over the superficial symptoms of early syphilis is, I believe, entirely due to its local action as a skin stimulant, whether it be given internally or applied externally, and that it has no specific action on the poison itself.

The treatment I find very successful in secondary syphilis is by supporting the general health, administering tonics, especially iron, when required, and insisting on careful attention to the hygienic rules already laid down. By these means a gradual and certain recovery will be brought about, not by any empirical nostrum or specific, but by the ordinary rules of rational medicine, which might be employed equally well in the treatment of similar conditions occurring in any other disease.

Local treatment is useful for the sore throat and mucous patches occurring within the mouth during this stage of the disease. Astringent gargles, with occasional touching of the patches with nitrate of silver, assists the healing. The moist papules or condylomata found between two skin surfaces and in the neighbourhood of the vagina and rectum merely require cleanliness and dryness for their removal. Dryness may be secured by the careful dusting of the part with fuller's earth, kaolin, starch, or such like substance.

In tertiary syphilis, or the stage of gummatous deposits, iodide of potass is found to be of immense benefit. It may be combined with tonics, carbonate of ammonia, and cod liver oil, when these remedies are indicated by the state of the patient. Gummatous tumours are treated as follows:—1*st*, What ought not to be done. Do not remove gummata either by the knife or caustic. Abstain from opening a gumma even when fluctuation is present, as resolution may occur at any stage of its progress. Examples abound where gummata on the point of opening have been seen to diminish and become absorbed under iodide of potass. 2*nd*, What is to be done. Give iodide of potass in large and increasing doses, beginning with gr. x. thrice daily. The production of gummata is often combined with a low state of the organism, either anterior or foreign to the diathesis, or engendered by it, for which tonics and cod liver oil should be administered. In the early stages blistering is found to be a useful adjuvant to the internal treatment. After gummata have opened and formed ulcers, ordinary surgical principles must be our guide in treatment.

The same lines of treatment are to be followed in congenital syphilis.

In conclusion, I wish to say a few words with regard to the

preventive treatment of syphilis and venereal disease in general. It is not the duty of the medical man to advise the use of precautions during illicit sexual intercourse in order to prevent the spread of venereal disease, as by so doing he would give medical sanction to the practice of vice, and pander to a common delusion amongst young men that sexual intercourse is a physical necessity. But although it is not the duty of the medical man to teach the individual to protect himself, it is the duty of the State as far as possible to lessen the amount of contagious disease. This I believe will not be done by the Contagious Diseases Acts at present in operation. The reduction of venereal disease can only be brought about by a law which would act equally on men as well as women. Let an Act be passed making it penal for any person knowingly to infect another with venereal disease. Convictions, no doubt, would be difficult to obtain ; but however rare they might be, the knowledge of the existence of such a law would have a salutary effect in diminishing the amount of venereal disease.

Every surgeon who has had much venereal practice must know that men are much to blame for the spread of disease. It is very disgraceful that it should be so, for men almost invariably know when they are diseased, and they have no excuse, like the unfortunate women who live by prostitution. Any enactment that would prevent men as well as women from propagating venereal disease ought to receive a vigorous support from the medical profession.

Mr Duncan remarked, in reference to the first paper, that it did not lend itself to criticism. He could not say the same of the second. The general scope of the paper was one with which they could thoroughly agree. The general method of treatment they would be inclined to follow to a certain extent. Dr Cadell's statements were deserving of most careful consideration, as coming from one who has given a great deal of attention to the subject. At the same time, Mr Duncan would venture to disagree with him on some points. He had put up a number of opinions with regard to the mercurial treatment of syphilis, and had knocked them over very satisfactorily ; but Mr Duncan thought that most of them would agree that the essential fact remained that some syphilitic manifestations did disappear under the influence of mercury. Certain forms of skin eruption—those in the second stage especially, and many in the third—improved rapidly when mercury was given. All the rest was a matter of opinion. How far mercury was to be looked upon as an antidote no one could say, any more than they could how far iodide of potassium was to be considered an antidote. Mercury did good in certain manifestations of syphilis, so did the iodide ; but that did not make them antidotes. He did not necessarily hold, nor did he maintain the opposite, that either shortened the course of syphilis. The question was, were the disadvantages of mercury so great, or its evils

so manifest, that they should not use it in syphilis? He thought not. In large doses for a long time, no doubt, it had a bad effect. He had administered mercury in small doses for a considerable time without any bad effect. The experiments of Keyes and Van Buren with reference to the increase of blood-corpuscles were not altogether valueless. Whether this was a point of importance or not he was not prepared to say. Such, he thought, were reasonable views with reference to the administration of mercury. It was a fact that it improved the manifestations of syphilis, and that when cautiously administered there was no serious evil to deter its use. He was neither a mercurialist nor a non-mercurialist, but he should like to have mercury in his armamentarium.

Mr Joseph Bell would go, perhaps, a little nearer Dr Cadell's position than Mr Duncan did; but he could not go the whole way. His own experience was, that though many cases did well without mercury, there were also cases in which he dared not withhold that drug, more especially cases in which the eye was affected by syphilitic iritis. He should like to get from Dr Argyll Robertson his experience on this point. There were also cases of skin eruption in young men which no doubt would go away without mercury; but many of these patients had their business to attend to, and they wished the rash removed as speedily as possible. There was no doubt that mercury effected this quicker than nature; and as it did so without causing any serious evil, he felt it was right to give it.

Dr James Carmichael had been forestalled in a good deal he intended to say by the remarks of Mr Duncan. He would, however, like to refer to the use of mercury in a class of cases in which he was peculiarly interested, namely, the syphilis of childhood, congenital as it most frequently was. In these cases, when any local manifestation of the disease proved intractable and threatened the life of the child, he felt that he could not rightly withhold the administration of mercury. He would just mention nasal catarrh or mucous patches on the mouth and fauces, when they prevented sucking, and tended gradually to exhaust the infant, and ultimately, if not arrested in their course, cause death. In extensive and intractable skin eruptions the same thing held, that the only drug, so far as he knew, that would arrest the manifestation was mercury. He highly disapproved of mercurial treatment as a routine, as given with a view to cut short the disease, or upon the assumption that it was a specific. He believed that most cases of syphilis were much better treated without it, and in the manner well laid down by Dr Cadell; but he felt that when necessity arose, from local causes, of arresting the manifestations of the disease, mercury should be administered, for there could be little doubt—as little as about any fact in therapeutics—that this drug had a wonderful effect in regulating or restoring to the natural balance disordered local capillary action.

Mr Symington said that at the outset Dr Cadell ridiculed the idea of an antidote to special vital poisons, and, among them, to syphilis; but if they considered how little they knew of these poisons, and remembered the effect of certain drugs on certain such poisons, as quinine on ague, and the effect of vaccination on small-pox, he thought they would agree that Dr Cadell was assuming too much when he said there was no antidote to syphilis. It was unscientific to say that there never would be an antidote. Again, Dr Cadell, in his paper, was always referring to the treatment of syphilis on general surgical principles, by which he supposed he meant ordinary methods of dressing, giving tonics, and such like. In the later stages, however, he gave large doses of the iodide of potassium. He would like if Dr Cadell would tell them how the iodide acted on general principles. His own impression was that they knew little or nothing about it.

Dr Argyll Robertson had not intended to speak, had he not been asked for his experience with regard to some of those inflammations of the eye connected with the secondary manifestations of syphilis. His experience was partly that of the mercurialist, partly that of the non-mercurialist. In iritis he had no hesitation in saying that cases did occur in which, all other methods of treatment failing, the judicious administration of mercury certainly did good. In all inflammations of the eye he tried to avoid the use of mercury, because he felt that if it were injudiciously given, or without good cause, disastrous effects might be produced, and therefore, unless good cause was apparent, it was better to withhold it. He treated all cases at first on ordinary general principles, and by suitable local remedies. But, such measures failing, he had no hesitation in giving mercury. He had noticed in obstinate cases of syphilitic iritis that whenever the system became affected by the mercurial there was an immediate improvement in the syphilitic manifestation. He might add that in the eye they had sometimes an opportunity of studying some of the tertiary manifestations of syphilis, *e.g.*, syphilitic retinitis. There he found that mercury in small doses, as well as the iodide, did good.

Professor Simpson began his practice as a very definite antimercurialist, as did most of the students of Bennett and Syme. These two men taught that syphilis was to be treated and cured without the administration of mercury in any form. His experience of the disease was in great measure confined to the manifestations of it in young children, in pregnant women, and women affected through the ovum. In these cases he began cautiously and reluctantly to administer mercury, and soon came to the conclusion that one was not always justified in withholding it. There were cases of thickening of the pelvic organs where the usual antiphlogistic remedies were given without producing a good effect, and if there was a syphilitic taint he found that a mercurial

soon began to effect an improvement. There was no doubt, also, that in the syphilitic diseases of children mercury was often of decided benefit. To his mind the most valuable paragraph of Dr Cadell's paper was his last, and it was worth the while of the Society to take up and face the question of extending the principles of a Contagious Diseases Act to men. He supposed all of them had seen distressing cases where a man affected with syphilis had married a young, healthy woman, bringing her into a most deplorable condition; and if children were born of the union they were generally, in the poorer classes at least, a burden to the community. For his own part he was ready to follow Dr Cadell in this new crusade.

Dr Miller was sorry that he must add one to the number of those accumulating against Dr Cadell. Holding the position he did of surgeon to the Lock Hospital, it might be expected that he should say something on this subject. He had listened with very great pleasure to Dr Cadell's paper, and his disappointment was that it was so short, as there was a number of important points on which he had not touched. He had noted one or two things he wished to refer to. The main point was the treatment of syphilis by mercury. He thought that on this point Dr Argyll Robertson had given valuable information, and had really hit the nail on the head. The question was not whether mercury was an antidote to syphilis, but whether it did any good. There was no doubt that it did in some of the manifestations of syphilis, and therefore it could not always be withheld. Very little, he noticed, was said of iodoform. Among all the substances recently brought forward for the local treatment of syphilitic manifestations, he had not got such good results as from it. He was in hopes that Dr Cadell would have told them something of the value of the iodide of potassium in the different stages of syphilis. His own experience was that it had no action, or next to none, in secondary syphilis, except in one particular class of cases, where there was severe periosteal pain. He found the iodide very useful in gummata, where he gave it in large doses with exceedingly good effect. He hardly ever blistered gummata now, as he found the iodide in most cases alone sufficient to remove them. With regard to the statement that mercury ought not to be given to those who were debilitated, he might say that most of his patients came to him in a miserable, debilitated condition, and he had never found mercury, when properly given, do harm, but rather good. He was glad to notice that Dr Cadell, like the majority of practitioners, disapproved of alcoholic liquors, in the treatment of syphilis. As all were agreed that syphilis was a debilitating disease, and that tonic treatment was necessary to enable the patient to contend with it, the non-use of alcoholics was tantamount to a declaration that they are not tonics. This was quite his opinion, and he consequently never administered

alcoholics in the Lock Hospital, though the majority of his patients were accustomed to take them, often in large quantities, before admission.

Dr Finlay had one remark to make. It seemed to be supposed that the non-mercurialists totally denied the value of mercury in syphilis. They did not. They acknowledged that it did a little good, but they held that the bad effects from it outweighed the good. In large doses, and prolonged, it certainly did a great deal of harm.

Dr Allan Jamieson would like to ask Dr Cadell if he had noticed whether tertiary symptoms appeared less frequently in cases treated on the non-mercurial principle than they did in cases treated with small doses of mercury. Von Bärensprung had stated that he could not express an opinion either way. He was not sure that tertiary symptoms were avoided any more by the non-mercurialists than they were by the mercurialists.

Dr Allan Gray said the title of the paper was, "On the Treatment of Syphilis." He thought it should have been, "On the Non-mercurial Treatment of Syphilis." He wished to ask Dr Cadell's opinion on the compound sarsaparilla decoction which the Englishmen were vaunting so much. As to antidotes for vital poisons, there were none except possibly for splenic fever, though sometimes we heard of them for hydrophobia. But if quinine did good in ague, ammonia in cases of snake-bite, and other drugs acted well in diseases which were manifestations of some vital poison, he saw no reason why mercury should not be given in syphilis, as there was no doubt that many of the syphilitic manifestations were improved by it.

Dr Cadell, in replying, said that in his experience syphilis, when treated on the non-mercurial plan, ran a shorter course than when mercury was administered. Tertiary symptoms were also very rare indeed in his practice, and he usually never saw them except where mercury had been given. So far as antidotes were concerned, the examples selected were somewhat unfortunate. Quinine was not an antidote to malarial poisoning, and vaccination was not an antidote to, but a preventive of small-pox. It was not given after the poison was received into the blood. He thought Dr Robertson could not, notwithstanding his remarks, have very much faith in mercury, else he would use it much earlier than he did in cases where the consequences of disease might be very serious to so delicate and important an organism as the eye. As to the compound decoction of sarsaparilla, he considered that as much ditch-water would be of equal benefit.

Meeting II.—December 7, 1881.

Dr P. Heron Watson, *President, in the Chair.*

I. *Dr Buist* showed the THORACIC VISCERA of a patient who died the previous day from malignant stricture of œsophagus, followed by circumscribed gangrene of left lung and double pneumonia.

II. *Dr Allan Jamieson* showed two specimens of SALVE MUSLIN sent him by Dr Unna of Hamburg, the inventor. Dr Unna had invented both salve muslin and plaster salve muslin as convenient means of applying ointments and plasters. The preparations were put up in rolls ready for use, and when a piece was required they had simply to cut it off and apply it to the part, fixing the plaster muslin with a bandage. The ointments in the two specimens were the iodide of lead and the benzoated oxide of zinc, but any other ointment could be prepared in the same way.

III. *Dr Miller* showed a URETHRAL CALCULUS he removed from a patient in Dr Duncan's wards when he had charge of them. The man was sent in with an impassable stricture so-called. No instrument could be passed into the bladder, but the cause of obstruction was not a stricture, but a calculus. This Dr Miller cut down on and removed. The preparation was interesting, first, because of its large size; secondly, because there were two calculi, and thirdly, because of the relation of these two to each other. They seemed to have been originally one, but now one fitted into the other in the form almost of a cup and ball, and where they fitted the surfaces were perfectly smooth and polished; elsewhere they were rough.

IV. *Dr Leslie* then read his paper entitled

ON HEREDITARY TRANSMISSION OF DISEASE.

I.—Method of Graphic Representation.

While recording cases of mental disease in the capacity of Assistant Physician at the Stirling District Asylum, my attention has been specially directed to the subject of hereditary transmission by the frequency with which the statement that there is "insanity in the family" is made by the friends of patients. With equal frequency, and often with perfect truth, the occurrence of insanity in any other member of the patient's family is denied.

In many cases, however, we are led to believe that heredity has been a factor in the causation of the mental disease, even when no insanity can be traced in the family history. In these cases the morbid condition is usually attributed by the friends to some ex-

citing cause of palpable insufficiency, and near relatives of the patient are found to have suffered from diseases not mental but distinctly neurotic. Cerebral apoplexy, chronic hydrocephalus, and other diseases involving the nervous system, are much more common in the families of the insane than in the general population.

This interchangeability of diseases of the same type is well marked in the neuroses, but is also found to obtain in other groups. It gives an additional interest and importance to carefully recorded family histories, as from them we may not only ascertain the morbid heritage of our patients, but they will also throw a side-light on the pathology of the inherited diseases.

The ordinary method of recording hereditary history, which consists of noting the number and relation to the patient of individuals affected with like disease, has many disadvantages. The view which is thus afforded of the family history is at best fragmentary. No idea is gained of the proportion of unaffected to affected persons in the family; the results are inconvenient for purposes of generalization; and the informants, who are usually non-medical, are very prone to omit diseases which do not appear to them to belong to the same type as that from which the patient suffers.

By the use of the "heredity chart," which will be described in this paper, it is hoped that a distinct advance may be made in the direction of scientific precision. From it we may obtain a graphic record of—1. The individuals most nearly related to the patient. 2. The sex of each individual. 3. Their order of birth in their respective families. 4. Their degree of relationship to the patient and to each other. 5. The noteworthy diseases from which they and the patient have suffered. 6. The proportion of affected to unaffected individuals. 7. The genealogical order in which the diseases have appeared in members of the related families.

The blank chart, of which a copy is appended to this paper, essentially consists of five horizontal and parallel rows of ciphers. These rows are separated from each other by interspaces of about half an inch, and are numbered on the right side, 1, 2, 3, 4, and 5, from above downwards. The ciphers in the three upper rows are divided by a median vertical line, those on the right side of the line being headed "paternal descent," and those on the left side "maternal descent." At the left side of the chart there is a series of blank lines headed "diseases," and numbered from above downwards. The patient's name, disease, and the date of taking the history are noted opposite their respective headings at the top of the chart. For purposes of convenience a few general directions have been appended to the charts, which have been lithographed and printed for use in the Asylum and for the illustration of this paper.

The ciphers are made to represent individuals when a sex mark is affixed to them. I have adopted arbitrary signs for this purpose, viz., a straight line, the upper part of the cipher for a male, the lower

NAME OF PATIENT..... DISEASE..... DATE.....

	DISEASES.	MATERNAL DESCENT.	PATERNAL DESCENT.	
1		○○○○○○○○○○○○○○○○○○○○	○○○○○○○○○○○○○○○○○○○○	1
2				
3				
4		○○○○○○○○○○○○○○○○○○○○	○○○○○○○○○○○○○○○○○○○○	2
5				
6				
7		○○○○○○○○○○○○○○○○○○○○	○○○○○○○○○○○○○○○○○○○○	3
8				
9				
10		○○○○○○○○○○○○○○○○○○○○○○○○○○○○○○○○○○○○		4
11				
12				
13		○○○○○○○○○○○○○○○○○○○○○○○○○○○○○○○○○○○○		5
14				
15				
16				

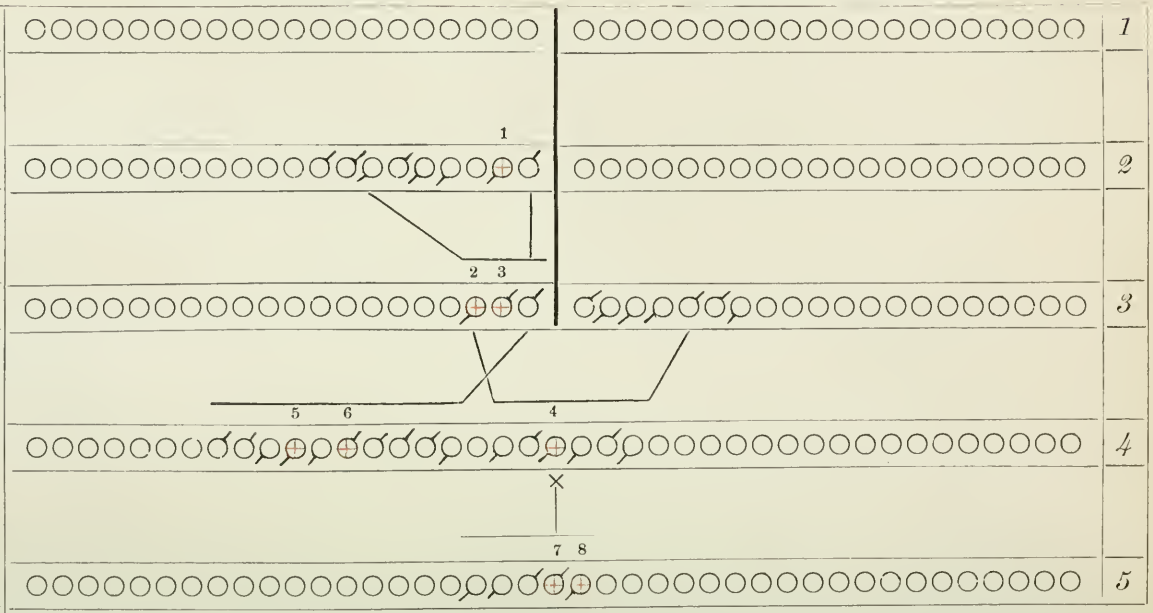
N.B.—In this Chart the ciphers are marked ♂ to indicate a male, and ♀ for a female. Only ciphers having these sex marks represent individuals. Individuals placed side by side are members of the same family, and are arranged in the order of birth, from the eldest at the left to the youngest at the right. Blank ciphers separate the members of related families of the same generation. Vertical or oblique lines are drawn in the interspaces from parents to children. The parallel rows of ciphers marked on the right side 1, 2, 3, 4, and 5, contain individuals belonging to the generations of the great-grandparents, grandparents, parents, patient and patient's children respectively.

Individuals affected with noteworthy disease are marked with a cross and numbered, the disease being indicated at the corresponding number on the left side of the chart. The mark × is placed below patient.

NAME OF PATIENT, P—— J—— DISEASE, *Mania.* DATE, *30th Sept. 1881.*

	DISEASES.
1	*Mania.*
2	*Mania.*
3	*Melancholia.*
4	*Mania.*
5	*Epilepsy.*
6	*Mania.*
7	*Chronic Hydrocephalus.*
8	*Chronic Hydrocephalus.*
9	
10	
11	
12	
13	
14	
15	
16	

MATERNAL DESCENT. PATERNAL DESCENT.



N.B.—In this Chart the ciphers are marked ♂ to indicate a male, and ♀ for a female. Only ciphers having these sex marks represent individuals. Individuals placed side by side are members of the same family, and are arranged in the order of birth, from the eldest at the left to the youngest at the right. Blank ciphers separate the members of related families of the same generation. Vertical or oblique lines are drawn in the interspaces from parents to children. The parallel rows of ciphers marked on the right side 1, 2, 3, 4, and 5, contain individuals belonging to the generations of the great-grandparents, grandparents, parents, patient and patient's children respectively.

Individuals affected with noteworthy disease are marked with a cross and numbered, the disease being indicated at the corresponding number on the left side of the chart. The mark × is placed below patient.

part for a female. These signs, which are seen in the directions and also in the second chart appended to this paper, have been chosen on account of the facility with which they can be written.

In the completed chart only ciphers having these sex marks represent individuals. Individuals placed side by side without any intervening blank cipher are members of the same family, and are arranged in the order of birth, from the eldest at the left to the youngest at the right. Blank ciphers separate the members of related families of the same generation.

In the upper row of ciphers are represented individuals belonging to the generation of the patient's great-grandparents, viz., the great-grandparents, paternal and maternal, and the other members of their families. Those paternally related are represented on the right, the maternal relatives on the left side of the median line. The second row contains the grandparental relatives arranged in the same way. The third row contains the parental generation, *i.e.*, the parents, uncles, aunts, etc. In the fourth row is represented the family of which the patient is a member, and also families of cousins of the same generation. The fifth row contains the patient's children, and related individuals of the same generation.

The family to which the patient belongs is that first recorded in filling up a chart. The members composing it are represented in their order of birth, and the mark × is placed below the patient's cipher. I usually arrange the patient's family symmetrically under the line which separates the paternal from the maternal relatives. The members of the father's family may be next represented in their order of birth, the cipher to the right of the median vertical line in the third row being used for the oldest member of it. The mother's family is noted in the same row, but on the left side of the vertical line, the cipher next to the line being used for the youngest member. The informant should be asked to enumerate the father's family from the oldest to the youngest, and the mother's in the reverse order. Vertical or oblique lines are then drawn from the ciphers which represent the father and the mother to a horizontal line drawn above the ciphers which represent their children (*vide* Chart II.) The degree of relationship of all the members of the three families is thus indicated. The next family to be noted is that of the paternal grandmother in the second row, the cipher to the right of the median line being used for the oldest member. A cipher is left blank between that representing the youngest member of this family and the oldest of the paternal grandfather's family, which is next recorded. The families of the maternal grandfather and grandmother are represented in a corresponding manner at the left side of the median line. Lines are then drawn from the ciphers representing the grandparents to horizontal lines drawn above their families, and the degree of relationship of the individuals of all the families represented is now seen. The great-grandparental generation is then filled in, and again lines are drawn from parents

to children. Lastly, the fifth row, containing the patient's children and other related individuals of the same generation, may be filled in and the mutual relationship expressed by lines drawn in the interspaces.

By following the method just described we obtain a graphic record of the existence of the individuals related by blood to the patient. We now inquire into the medical history of each, and, when any are found to have suffered from noteworthy disease, the cipher representing the individual is marked with a cross and numbered, the disease or diseases being indicated opposite the corresponding number on the left side of the chart.

The most remote generation represented is first inquired into, and the disease of most remote individual affected is put opposite No. 1 in the list of diseases; that of the youngest affected member of the most recent generation is the last, so that on glancing down the column the diseases are met in their genealogical sequence. Individuals unaffected by noteworthy disease are only characterized by the sex marks.

The investigation of medical problems being generally most efficiently conducted among hospital patients and other persons usually belonging to the poorer classes, it may be urged that these rarely have records of the great-grandparental and grandparental relatives. In the great majority of hospital patients we can obtain no trustworthy information beyond that referring to three generations, and, therefore, when using the heredity chart, must leave the rows of ciphers in which the more remote relatives would be represented blank. It should be observed, however, that the fault in these cases rests with the common sources of information, and not with this particular method of record.

The second chart appended to this paper may be accepted as a fairly typical example, although more complete histories are often obtained. Only the well-marked neuroses occurring in the family have in this case been recorded. No information was to be had concerning the great-grandparental generation nor of the paternal grandparents. The paternal grandmother was the third member of a family of six individuals, all unaffected by neuroses. The maternal grandfather was the younger of two, the elder being a grand-aunt of the patient, who was a maniac; and as she is the most remote relative found to have suffered from neurosis, her cipher is numbered 1, and her disease placed first on the list. Lines are drawn from the ciphers representing the maternal grandparents to those of the patient's mother's family, which is seen to consist of three members. The patient's mother, who suffered from mania, was the eldest. The second was an uncle, who was melancholic; and the youngest was an uncle, unaffected. On the right side of the median line is represented the family of which the patient's father was a member. It consisted of seven persons, all unaffected, the father being the fifth born. Lines drawn from the

father and mother's ciphers are then followed to those of the family to which the patient belongs. It consists of six individuals, of whom the patient, who suffers from mania, is the third. The position of the patient's cipher is indicated by the cross drawn below it. On the same row another family is represented, viz., that of which the patient's younger uncle is father. The fourth and sixth members of it were affected with epilepsy and mania respectively. Lastly, in the fifth row of ciphers the children of the patient are shown, five in number, the fourth and fifth having suffered from chronic hydrocephalus.

I have given an illustration of the use of this method in its simplest form, by which we obtain a graphic record of well-diagnosed disease of a single organic system. In a subsequent paper I propose to give the results gained by the use of the heredity charts in cases where only nervous diseases are considered. In practice, diseases of systems other than that most obviously affected in the patient are often believed to have intimate relation with the patient's state, and are recorded. By the use of a more extended code of signs information of a general or strictly physiological kind may be given. A friendly critic has suggested that individuals whose existence is noted, but whose medical history is not ascertained, should be specially distinguished. This may be done by marking the ciphers with negative signs. Facts of twinning, still-birth, and sterility are also of importance, and should be noted by arbitrary marks.

For the loan of papers and for advice kindly given I am indebted to Dr Arthur Mitchell, of the General Board of Lunacy, and to Dr Maclaren, Superintendent of the Stirling District Asylum.

Mr Symington said he did not pretend to be acquainted with the questions involved in the investigation of hereditary transmission of disease, but he could bear witness with regard to the facility with which the patient's family history could be taken and recorded, as he had seen Dr Leslie at work in the Stirling District Asylum. The chart used was, doubtless, somewhat complicated, but it gave a large amount of information in a very scientific manner, so far as it could be obtained from the friends of patients.

Mr Chiene thought the chart would be very useful in certain cases of surgical diseases, more especially of tumours. The point he especially noted about it was, that information was given of all the members of a family—those who were in good health, as well as those who were not.

The President thought the chart would be of vast importance for life insurance information.

Dr Bruce drew attention to the fact that Dr Leslie had not provided sufficiently in his chart for individuals regarding whom no information could be got. He thought there should be some distinctive mark for them.

Dr Leslie stated that he had now taken the family history of about 120 patients in this way. In no case had he trusted the patient himself. He endeavoured to get the best possible information out of different friends. The number of individuals whose medical history could not be obtained when first filling up a chart constantly decreased by extended investigations.

V. *Dr James Carmichael* then read his paper entitled

SOME OF THE SEQUELÆ OF ACUTE INFECTIOUS DISEASES IN CHILDREN.

THE pathology of chronic ill-health in children is of much practical interest, and the difficulty of arriving at a correct judgment of individual cases is sometimes very great. In the out-patient room of a children's hospital, the oft-repeated expression of "falling" or "wasting away" is one of the most frequent which the physician hears. A careful physical examination in a large proportion of cases will be sufficient to reveal the presence of some disease. Not unfrequently, however, such exploration fails to throw any light upon the case, and it is only after an attentive consideration of its history, and a more prolonged study, that we can arrive at any definite conclusion as to its nature.

Perhaps the most common causes of chronic ill-health in children are, syphilis, rickets, and scrofula; the two former chiefly commencing in infancy, the last manifesting itself later on in childhood. These I do not propose to consider, but rather to offer a few observations on some of the less frequent, and perhaps in many cases not so generally recognised, causes of ill-health in children after the more common acute infectious diseases. When I say not so generally recognised, I mean as being directly or indirectly induced by, or a sequela of, these diseases.

In the examination of sick children, in hospital practice especially, I always try to impress upon students the necessity of a strict inquiry into the previous history of the case, as likely to give a clue to its elucidation. This is all the more necessary, as among the poorer classes especially, and even in practice generally, there is a tendency, if not to ignore, at all events to regard as trivial, the common acute infectious diseases of childhood. I need hardly say I allude more particularly to scarlatina, measles, and hooping-cough. Of so little importance do mothers consider these maladies, that not unfrequently in the hospital out-patient room I find, in answer to the query, "Has the child ever had any previous illness?" the reply is in the negative, when, to the succeeding question, "Has the child had measles, hooping-cough, or scarlatina?" an affirmative is at once given, thereby impressing one with the idea that mothers consider these diseases of little or no importance in the catalogue of their children's ailments. I therefore always

teach the necessity of making careful and specific inquiry as to the previous existence of these diseases.

In obedience to the generally recognised law that organs or functions develop tendencies to disease in direct ratio to their normal or physiological activity, we find that in children the acute diseases are a fruitful cause of initiating chronic disturbance of function or disease in certain organs, or systems, which present great functional activity in the early periods of life. In childhood the function of nutrition in all its parts is unusually active, and also the process of development, and it is by an interference with these functions that the more common acute diseases appear to exercise such serious after-effects in children.

Practically, the most common acute infectious diseases which we have to deal with in children are scarlatina, measles, and hooping-cough. Comparatively few children attain the age of puberty without having been attacked with one or other or all of these complaints, and a certain proportion of them suffer immediately or remotely from chronic ill-health which may or may not be accompanied by some organic affection of internal organs. In these diseases there are certain sequelæ which are considered more or less peculiar to each. I do not intend to enter into a general discussion of these, but to refer to some less frequent, often more remote, and not so generally recognised as directly connected with the disease which has preceded them, possibly by many months, or even years.

General Debility, persisting long after the ordinary period of convalescence, is a condition not unfrequently met with after an attack of measles, scarlatina, or hooping-cough, and this apparently independent of any existing organic disease. The symptoms which characterize this condition are generally those indicating a lowering of vital power, and interference with the nutritive functions of the body, more or less emaciation, languor, and depression, disinclination to play, want of appetite, and sometimes headache. During convalescence from such diseases, and for some time after it is our duty to bear in mind the necessity for an observance of proper dietetic and hygienic rules, and the administration of tonics and the adoption of all means tending to restore the bodily functions to a healthy state. In the great majority of cases, under such conditions, all goes on well, and our little patient steadily recovers from the evil effects of the disease. In certain instances, however, such a favourable result does not obtain, and the child may remain weak and "out of health" for a considerable time, and ultimately fall a prey to some other disease, the ravages of which once started, the system, on account of its debilitated state, is unable to resist. General debility must, then, be combated by careful management, in order that the system may be enabled to resist the possible onset of other diseases.

Lymphatic Glandular Affections may follow any of those diseases to which I have referred.

The disturbance of nutritive tissue function which acute infectious disease produces, naturally tends to affect the lymphatic system, which is so intimately connected—although the exact function of the glands has not yet been determined by physiologists—with nutrition. Through the researches chiefly of Klein, we are now well informed as to the anatomical structure and relations of the lymphatic vessels, and it cannot be doubted, from the close connexion which exists between them and the ultimate tissue elements, that the functions of this system, and of the glands through which the products carried by the vessels pass, are of great importance in nutrition. Recent researches would seem to point to an intimate relation between the ultimate lymphatics and the connective tissue, and the probability that these vessels form a kind of connective-tissue circulatory system. In any case, it can hardly be wondered that the glands are so frequently affected in children after acute disease. An appreciation of this fact, and a knowledge of the liability of the lymphatic glands to temporary or permanent disease, gives a key to the pathology and diagnosis of many of the more serious and fatal diseases of childhood.

In a rough way the lymphatic glands may be divided into two classes, those which are situated subcutaneously on the surface of the body, and in the great cavities, in intimate relation to the viscera. It is more particularly to the latter that I desire to refer. The frequent enlargement of the cervical glands after scarlatina is well known. The equally common and not so generally recognised forms of bronchial and mesenteric glandular hyperplasia, following more particularly measles and hooping-cough, are too often overlooked. The cause of this would appear to be the difficulty of making a positive diagnosis in such cases, arising from the total absence of physical signs, and also the length of time which often elapses—it may be months or years—before any evil effects manifest themselves, the true state of the case remaining obscure until a post-mortem examination reveals its exact nature.

1. *Bronchial Glandular Hyperplasia, Bronchial Phthisis.*—Whether in all cases of measles where there is much bronchial catarrh, and in most cases of hooping-cough, the lymphatic glands are irritated and enlarged during the acute stage of the disease, returning to their normal size after its disappearance, is still unsettled. The fact that they are enlarged in many cases, and remain permanently so, must, I think, be admitted. During convalescence from measles and hooping-cough it is of extreme importance to keep this fact before us, and also the possibility of ultimate caseous degeneration of the glands, which may lead to a fatal issue by steadily progressive emaciation and exhaustion, or, as more frequently occurs, the production of secondary general tuberculosis, which usually causes death in children by meningitis. In inquiring into the results of autopsies in the Royal Hospital for Sick Children for the last few years, I find it is quite an exceptional thing to meet with cases of

tuberculosis in which there did not pre-exist some caseating mass in the lymphatic glands or elsewhere. In a large majority of these cases the bronchial or mesenteric glands were affected, and subsequently to either measles or hooping-cough. Whatever the explanation may be, or what the rationale of its occurrence, or the sequence of events, the fact remains as I have stated, and I cannot help thinking it lends strong support to the correctness of the well-known views of Buhl, Colnheim, Burdon Sanderson, and others, as opposed to those of Klebs and Villemin, that the infecting substance is formed in the glands themselves, and not from some specific virus developed outside the body altogether. Whether caseating glands in children be one of the chief factors in the production of tuberculosis, as they are certainly of chronic ill-health, the importance of recognising their presence at an early stage cannot be overstrained; and this brings me to say a few words as to the diagnosis more particularly of enlarged bronchial glands. These glands are situated in the posterior mediastinum, in immediate relation to the bifurcation of the trachea and the roots of the lungs. On the surface of the body the site of the former corresponds anteriorly to the first bone of the sternum, posteriorly to the second or third upper dorsal vertebræ. The glands are ten or twelve in number, and lie in the cellular tissue of the posterior mediastinum, in close relation to the trachea and bronchi. It may be at once stated, as a fact generally admitted, that, although considerably enlarged, their recognition by physical exploration is usually attended by negative results. One of our most careful clinical observers of disease in children states, "In order to afford signs of its presence, the disease of the glands must be sufficient to produce considerable enlargement; for unless their size is so much increased as to produce derangement of function in neighbouring organs, the lesion is one which cannot be satisfactorily diagnosed."[1] It may be stated, likewise, with tolerable probability, and my own experience bears this out, that in the larger proportion of all cases met with, and in those in which serious results follow the chronic glandular hyperplasia, the enlargement has not been sufficient to cause injurious pressure on neighbouring structures. If this be the case, the usual signs which are described as denoting the presence of these buboes, such as venous turgidity and lividity of the face and neck, dyspnœa and spasmodic cough, and dulness, either anteriorly over the upper sternal region or posteriorly, will not be present. What have we, then, to guide us in diagnosing this the largest class of cases, in which really no well-marked physical signs exist? In regard to percussion dulness, I have seldom found any marked change in examining the front of the chest over the sternum, but in a certain proportion of cases there has been dulness more or less marked in the interscapular region, immediately on each side of the spines of the upper dorsal vertebræ. Laying physical signs,

[1] Eustace Smith on *Wasting Diseases*, p. 261.

however, aside, have we nothing to guide us in the general condition of the patient in other respects, and particularly in the *clinical history* of the case? The condition—enlarged bronchial glands—is sometimes known as tuberculization of bronchial glands, or bronchial phthisis. This last term is clinically correct, because one of the chief, and in some cases, I believe, the only sign we have to guide us is steadily progressive emaciation, which cannot otherwise be accounted for. If, along with this increasing emaciation and the absence of signs of organic disease of internal organs, we have the previous history of hooping-cough or measles, the two diseases which above all others are most frequently followed by bronchial glandular hyperplasia, our diagnosis will be pretty well assured. In general terms, it may be stated that, given a child who has suffered within a year or eighteen months previously from either of those diseases, and who is in a chronic state of ill-health and undergoing progressive wasting with no symptoms of disease of any internal organ, the probable existence of bronchial phthisis, more rarely of mesenteric phthisis, may be suspected. In illustration, I extract from the record of a case, one of many similar which I possess, a few particulars. Alex. M'D., æt. 2½, was brought to the Royal Hospital for Sick Children on 8th February 1881, suffering chiefly from debility and wasting. The mother stated he was a healthy child till he was attacked by measles a year ago, since which he has never been quite well. He was a breast baby. There were no marks nor history of syphilis. On examination all organs yielded negative results as to signs of disease. There was nothing positive in regard to the child's condition but progressive emaciation. He was under careful observation for five months, and the course of the case was watched with interest by the gentlemen attending the out-door clinic. I ventured to express an opinion, many weeks before the child died, based upon the general history of the case, and its negative clinical features, but more particularly on account of the antecedent history of measles, that subsequent to this disease, and as a direct result of it, bronchial glandular hyperplasia had been established, followed by caseation of the glands, and that probably general tuberculosis would follow, or was then actually existent. The subsequent history of the case amply verified such a diagnosis, the child succumbing to meningitis a few weeks after. On post-mortem examination the tracheo-bronchial lymphatic glands were enlarged and caseous, the lungs, liver, and other organs studded with small, gelatinous-looking, so-called miliary tubercles, and the brain presented all the usual characters of meningitis. This is a very ordinary history, as the records of our hospital testify. Measles is, I believe, the most common predisposing cause of this sequence of events. Hooping-cough also, as might be shown by bringing forward cases, causes a similar train of clinical features. I relate briefly one case in illustration.

Marion C., æt. 3 years 8 months, was brought to hospital on

10th August 1880. She was a healthy child, and never suffered from any illness until six months ago, when she was attacked with pertussis, which lasted for four months. Since then she has been quite free from cough, but her general health has not been satisfactory. On examination she was not an unhealthy-looking child, being fairly well nourished. She was, however, languid and listless, had little appetite for food, the bowels were irregular, the muscular system was soft and flabby. Ordered emulsion of cod-liver oil, regulation of diet, and change of air if possible. On the 13th inst., or three days after examination, she began to be troubled with vomiting coming on at irregular intervals without reference to the ingestion of food. On the 15th inst. drowsiness supervened, and she sank rapidly from meningitis. On post-mortem examination, the brain presented all the usual signs of basic meningitis and general subarachnoid effusion. The ventricles contained about six ounces of fluid. The lungs, liver, kidneys, and peritoneum were studded with tubercles. Tracheo-bronchial glands enlarged and caseous. The frequent occurrence of such a train of events as this following measles and hooping-cough is a clinical fact of very great importance, and its realization ought to make the physician more than ever careful to watch the progress of children who have suffered from these diseases for many months, even years, after the attack. Any deviation from the normal standard of health should be carefully inquired into and treated. It is of special importance, after all these acute infectious diseases, to attend to the dieting and general hygienic condition of children, more particularly, I think, to the digestive functions, and to administer such remedies as cod-liver oil, hypophosphites, or iodides. As a matter of routine, I am now in the habit of ordering these remedies to be continued for months after recovery from these affections, when there is any delay in convalescence or a return to healthy bodily function and the natural standard of health.

2. *Mesenteric Glandular Hyperplasia, Mesenteric Phthisis.*—This disease, although long considered to be almost solely the outcome of the scrofulous constitution, not unfrequently, although more rarely than the bronchial variety, attacks previously healthy children who have suffered from acute infectious disease. I have met with it after measles, scarlatina, and typhoid fever. It may also occur independently of all these conditions in carelessly fed children who have frequently had gastro-intestinal dyspepsia, or catarrh, or chronic diarrhœa. Well-marked examples of tabes mesenterica—and by these I mean cases where there is general enlargement of the glands, without any other special local affection, in fact, where the mesenteric disease is the really active and prominent condition from which the child suffers—are, comparatively speaking, rare. Slight enlargement of the glands is not by any means an uncommon occurrence in cases of general tuberculosis. The diagnosis of

this condition is not always easy, though perhaps hardly so obscure as the bronchial variety. The situation of the glands enables us to feel them more readily, and the oft emaciated state of the child, and the retracted condition of the abdominal parietes, lends additional facilities to diagnosis. There cannot be said to exist any special symptoms of this affection. The state of the digestive system is seldom natural, but not usually characteristic. We may either have constipation or diarrhœa, or an alternation of these. If the glands cannot be distinctly felt, we must arrive at our diagnosis very much in the way we are constrained to do in the bronchial variety, judging by the history of the case and the general state of nutrition. With reference to the diagnosis of mesenteric and bronchial phthisis and their association with general tuberculosis, I have made no allusion to the temperature, for I am convinced, from careful observations I have made now in a large number of cases, that the thermometer is a most unreliable guide to the presence of tubercule, *per se*, in the lymphatic glands or elsewhere. My observations on this point lead me to the conclusion that the actual existence of tubercle in organs, so long as there is no concomitant inflammatory action going on, does not cause any rise of temperature, the fact being that tubercles may exist in the lungs, liver, or elsewhere, for a long time without producing any irritation.

Nasal Catarrh is a frequent sequela of measles and scarlatina, but often thought little of and left untreated. In my experience it is sometimes attended by ulterior serious consequences, and even the milder forms of the disease cause much inconvenience and keep the child in an irritable state, and may seriously interfere with sleep and feeding. It is our duty, I submit, to treat such conditions by suitable local as well as constitutional means, even in the milder cases. In its simplest form the nasal mucous membrane is red and irritable, secreting freely, and the discharge, escaping anteriorly, often gives rise to an eczematous or herpetic eruption on the upper lip. The child is generally debilitated and feverish, and restless during sleep. Such cases yield readily to proper feeding and tonics, along with such applications as vaselin and lead ointment to anterior nares, or, if necessary, brushing with a solution of nitrate of silver. In the more severe forms of nasal catarrh you have increased inflammation and thickening of the mucous membrane of the anterior nares, often accompanied by superficial ulceration. When this condition is allowed to run its course, not unfrequently the anterior nares become nearly occluded, so that respiration is greatly interfered with.

The most aggravated case of this kind I have treated was that of a little girl, Marion M., aged three years, who was brought to the hospital with the history that her nose had been running ever since

she had measles, six months previously. On examining the openings of the anterior nares, the mucous membrane and sub-mucous tissues were much infiltrated, and the orifices only admitted a surgical probe with difficulty. The child was thin and miserable-looking and of scrofulous diathesis. Her appetite was bad, and sleep much interfered with. Under suitable local and constitutional treatment the structural condition of the anterior nasal orifices was entirely remedied. A more serious consequence of nasal catarrh is ulceration of the middle nares, with or without caries of the turbinated bones or vomer. This is more rarely met with, and generally occurs in strumous or syphilitic children, constituting true ozæna.

Gastro-Intestinal Affections.—Both scarlatina and measles may develop, during convalescence, different kinds of gastro-intestinal disorder. The follicular enteritis, following scarlatina more frequently than measles, is a well-known and dangerous complication. This condition, however, is generally well recognised, and I do not enter upon it.

Atonic Gastro-Intestinal Dyspepsia is not unfrequently met with, and is apt to persist for a considerable time, after both measles and scarlatina. The general symptoms are loss of appetite, usually thirst, tendency to nausea or vomiting after food, and not unfrequently diarrhœa, sometimes of a lienteric character. The child is thin, pallid, and at times feverish. There is generally, however, an absence of pyrexia of a continued character, and not unfrequently the temperature tends to be subnormal. The tongue in colour is either normal or slightly paler than natural, and deficient in epithelial covering. This condition is sometimes very intractable, and prolongs the period of debility during convalescence indefinitely. It requires very careful dieting, and the administration of food in small quantities at a time, and of a light, digestible nature, with small doses of arsenic, which acts often like a charm in restoring the tone of the stomach. Nux vomica is also of service, more especially in the intestinal variety, and when there is a tendency to lienteric diarrhœa. Another variety of dyspepsia, and one which has been dignified by the name of "mucous disease" by Dr Eustace Smith, is met with most frequently after hooping-cough. A perusal of Dr Smith's monograph on the subject well deserves attention. He describes, in his usual graphic manner, the clinical features of the aggravated form of this condition. It is characterized by languor, depression, disinclination to play, restlessness during sleep, and sometimes fits of "night terrors." The appetite is very capricious, there is generally constipation, alternating at intervals with irritation and looseness of the bowels. The tongue is flabby, clean, or slightly furred, with prominence of the papillæ, more particularly the fungiform, and usually covered with excess of mucus, giving it a glossy or varnished appearance. The stools are generally

costive, and contain a quantity of mucus. Alternating with this condition you have recurrent attacks of vomiting and diarrhœa, after which the child is often much relieved for a time, only to relapse after a certain period into its former condition. The disease is rarely seen in infants, but usually in children above the age of four. The treatment so carefully laid down by Dr Smith I have found generally successful. It is chiefly dietetic, and must be conducted on the principle of abstinence from saccharine and starchy kinds of food, as well as most kinds of vegetables, restricting the child chiefly to milk and bread, eggs raw or lightly cooked, meat soups, and meat. This condition is also associated with a harsh and dry state of the skin, and gradual and progressive emaciation characterizes the severe forms of the disease. Although the appetite is often good, sometimes voracious, the food is not properly digested, and causes flatulence, colic, and restlessness during sleep. Many of the well-marked and severe cases of this affection which have come under my observation have been associated with or followed by lymphatic glandular hyperplasia and caseation ending in general tuberculosis.

Cutaneous Eruptions are very frequent as a remote result of acute infectious diseases, and more particularly of measles. In hospital and dispensary practice the most frequent are the chronic pustular affections, ecthyma and impetigo, the former affecting the lower half of the trunk and legs, more rarely also the arms, the latter attacking the head. Both forms generally yield in due course to careful dietetic and tonic treatment, preceded by administration of stomachic medicine if there be any digestive derangement.

I regret that the limits of a short paper have prevented me from entering with more minuteness into a description of these sequelæ. My object has rather been, while describing leading features, to point out the probability of their intimate connexion with the diseases which have preceded them, and the necessity of the very careful management and treatment of children during convalescence and for some time after having suffered from any of these more common acute infectious maladies.

Dr Allan Jamieson said he was sure the Society was deeply grateful to Dr Carmichael for the paper they had just heard. He thought they ought to congratulate him on having been the first for some considerable time to have drawn for their benefit from the vast stores of clinical information in the Sick Children's Hospital. There was one point in the paper he noted to which he would like to draw attention. It was the intractability of nasal catarrh after measles, scarlet fever, etc. Dr Unna, whose preparations he had already shown, had suggested that the salve muslin might be used as a local application in such cases. He fitted it by means of a small indiarubber tube to the interior of the nostril, the tube leaving an aperture by which the child could breathe. The piece of salve

muslin was rolled round the tube, and this so enveloped passed into the nostril. A portion extending beyond was divided into three or four strips, and these folded over the outside to keep the tube in position. In this way the ointment was kept in contact with the nose, and the breathing was not interfered with. This, used as a supplementary method to other forms of treatment, local and constitutional, had proved very successful. He might also say, although it had no connexion with Dr Carmichael's paper, that that form of sycosis of the upper lip which was due to nasal catarrh could only be treated efficaciously in a similar way. Both the nasal catarrh and the sycosis had to be treated.

Dr Black said that enlargement of the lymphatic glands was a common affection of the children of the natives in South Africa. In the very youngest infants this had been verified by post-mortem examinations, which induced him to think the existence of these tubercular deposits was hereditary, and that the children were really born with them. It might be a question whether the meningitis and peritonitis so common in such cases was not a consequence of these scrofulous tumours infecting the system.

Dr Carmichael thanked the members for listening to his paper so attentively. He was especially obliged to Dr Jamieson for his hints as to the treatment of nasal catarrh. These cases, as he had pointed out, were often most intractable, and he was satisfied that though the persistence of the disease was due in great measure to the debilitated state of the patient, still the condition of the nostrils of itself tended to irritate the child and affect its general health. He was not quite sure if restless children would bear such treatment, but he would certainly give it a trial. As to the question of heredity, he was very much interested in the statements of Dr Black. Any such tendency would probably favour the development of glandular hyperplasia as a sequela of acute infectious disease.

Meeting III.—January 18, 1882.

Dr P. Heron Watson, *Retiring President, in the Chair.*

I. *Dr Byrom Bramwell* showed (1.) a PATIENT who had come under his notice at the dispensary for a dislocation of the shoulder, and who presented the extremely rare form of congenital misplacement of the heart in which the organ is *situated on the right side of the body, and in which the liver remains in its natural position.* There was no history of any affection of the lung, and there were no symptoms of thoracic disease. The case seemed congenital. There was a diffuse pulsation over the right side of the front of the chest, the maximum intensity of which was a point about an inch to the outside of the nipple. On inspecting the

chest a depression in the usual position of the heart was observed. So far as could be made out, the case was not one of complete transposition of the viscera, as the liver lay in its usual position on the right side. On measuring the chest the right side was found to be fully half an inch more than the left all the way down. (2.) A PATIENT, 70 years of age, who for the past twenty years had suffered from an aneurism of the left common carotid artery, and who had nevertheless been able to follow the occupation of a labourer. Twenty years ago he fell out of a light cart, one of the wheels passing over his neck. The injury was followed by considerable swelling in the neck, just over the region of the left carotid artery. A doctor to whom he applied told him that he was suffering from aneurism. He went to Dublin, where he saw a great many doctors; in fact, he seemed to be regarded as a medical curiosity, and he was admitted to an hospital. Hearing, however, that an operation was to be performed, he left the institution. The swelling, which was five or six times its present size, gradually diminished till it reached its present size, pretty nearly equal to that of a large egg. The swelling is pretty hard, globular, and pulsating; it is situated just over the course of the artery, and seems to be connected with it. On auscultation over the tumour, a double sound of a dull, muffled character is audible. Looking at the past history and the present condition of the case, Dr Bramwell agreed with the opinion of the Dublin surgeons, and thought the case was one of aneurism of the carotid artery. The history of the case, and the fact that the medical men who saw it shortly after the accident diagnosed it as an aneurism, made him inclined to believe that it was a traumatic aneurism of the carotid which seemed to have undergone a natural cure. (3.) TWO PHOTOGRAPHS, showing the hand of a man who, eight years ago, had sustained an injury to his ulnar nerve from a scythe. The appearance was almost exactly similar to that seen in progressive muscular atrophy. There was extension of the first phalanx and flexion of the others. Wasting of the inter-ossei was also marked. The nail of the little finger was absent, and the skin of the little finger was "glossy." Occasionally the patient felt twinges of pain shooting down the course of the ulnar nerve, showing that probably it was not completely divided by the injury. Without the history one would be very apt at first sight to consider the case one of progressive muscular atrophy.

II. *Mr Chiene* showed a RED INDIARUBBER CATHETER he had removed from a bladder where it had lain for twenty days. The patient is a practitioner in Edinburgh, at present in the Fever House, suffering from typhoid fever, under Dr Wyllie's care. On the fourteenth day of the fever he asked the nurse to give him a catheter, as he was suffering from retention. She, thinking that as he was a medical man it would be all right, gave it to him. He passed it, and the water escaped, but the catheter disappeared. He

felt it slipping up his urethra into his bladder. Mr Chiene saw him the next day, and examined with sound and lithotrite, but could not feel it. Mr Spence was called in consultation, and also examined him without finding the catheter. The bladder was irritable, and as the fever was then in progress, attempts to remove the instrument were desisted from for a time. In the meantime experiments were made on the cadaver. A similar catheter to the one lost was placed in the bladder, and it was found that the presence of the instrument could not be detected by means of the sound or lithotrite. Mr Chiene also found that he could not seize the catheter if he used the Thomson's scoop lithotrite in the ordinary way. He found that it could best be seized by keeping the instrument in the middle line, holding it upright (in which position the blades were just beyond the neck of the bladder), opening the blades there, then depressing the handle of the instrument, and pushing the lower blade as far along the floor of the bladder as he could get it, and at once shutting them. In this way he laid hold of the catheter five times out of six. Two days ago it was considered safe to anæsthetize the patient. The urethra was dilated up to 18 English, six ounces of a weak solution of carbolic acid were injected, and the lithotrite used in the manner described. The catheter was laid hold of at once and easily withdrawn. It was grasped 3 inches from one extremity, and withdrawn doubled on itself. It was slightly coated with phosphates.

III. *Dr Graham Brown* showed a CARCINOMATOUS UTERUS removed by abdominal section by Professor Simpson. The patient, a woman æt. 69, had come under Dr Brown's care some time before for an ordinary prolapse of the uterus, which was readily replaced and retained in position by a pessary. The pessary was removed one day in October last, and shortly after its removal a copious hæmorrhage from the uterine cavity took place. On per vaginam examination the cervix was found to be soft. There was a certain amount of retroflexion, and the fundus was felt heavy and hard. Professor Simpson saw the case with him afterwards, and confirmed his diagnosis that there was malignant disease of the fundus uteri. To confirm this the patient was put under chloroform some time afterwards, and the cervix dilated to allow of the introduction of the finger into the uterine cavity, when hard masses were felt. She recovered from this minor operation very well, and Professor Simpson performed the abdominal section last Saturday. She seemed to rally well from this, but on the fourth day the temperature went up and she died. What the cause of death was he would not like to say till after the post-mortem examination, which they were to perform that evening.

IV. *Dr Heron Watson*, the retiring President, then read his

VALEDICTORY ADDRESS.

Gentlemen,—It is hardly possible, at any point in our progress from year to year which implies the completion of an epoch in our history, to avoid retrospection; nor, perhaps, is it undesirable that such occasions should be made useful with the view of ascertaining the gain in knowledge as balancing the lapse of time.

The biennial election of your President affords him a reasonable excuse, before leaving the chair in which your generous confidence has placed him, to take a bird's-eye view on your behalf of the work over which he has had the good fortune to preside. This retrospective address has, with some reason, taken the place of an address on first presiding over your meetings. In availing myself of this privilege, and looking back over the too rapidly sped past of a two years' period, the most outstanding fact I have to chronicle is the sad losses we have sustained in the removal from among us of our late President, Dr Sanders, of Dr Wood, Dr Sharpey, Dr Omond, and Dr Handyside. It can hardly fail to be within your recollection the earnest address which only two years ago you heard from Dr Sanders's lips. You cannot forget how fully, in it, he justified the claim of biological science to be the source from which advance in scientific medicine might most reasonably be anticipated, and upon the more perfect knowledge of which all practical improvement in our profession might be said to wait. We little anticipated then that so soon we should see his face no more, that in the ensuing autumn, when only just returned from the pleasant relaxation of a well-earned holiday, he should be struck down by a form of disease upon the elucidation of which he had bestowed some of his freshest energies, and that ere the winter was past his place amongst us should be vacant. As one possessed of a great simplicity and guilelessness of character, as an honest and true worker, who was less inclined to take credit to himself than to do justice to others, as a suggestive thinker, a well-informed writer, a ready but infrequent speaker, he may well dwell in our memories as an example and a guide.

The sudden and unexpected death of Dr Andrew Wood, under circumstances so little anticipated, not unnaturally created a sense of consternation in many minds. He still filled so large a place in the councils of the College of which he was a prominent member, that few had thought how many years had come and gone since he first entered the profession, and how much more he was full of years than his mental activity in college matters and in medical politics would seem to show. Though in recent times he had not often taken a part in the meetings of this Society, there was a period in its history when he bore his own share in its debates and actively interested himself in its proceedings. Apparently the attractions of imperial politics, to which constitutionally he was addicted, came in the way of more purely professional matters

of interest at the middle period of his career, just as for twenty years past the Medical Act and the politics connected with the mutual actions and reactions of licensing bodies and universities afforded a scope for the line of thought which was both to him most easy and most congenial, and led him to lend himself heart and soul to questions which to the great mass of medical men seem unprofitable and distracting.

Another loss from the number of our Honorary Fellows deserves more than a passing record. Dr Sharpey's honoured name had long been connected with the Ordinary Fellows of the Society—since, in fact, the time that he resided in Edinburgh and made a reputation which, though wider-reaching in its sphere when secretary of the Royal Society, was quite as brilliant in the field of science while he was still an ornament of this medical school. In the end of 1879 the Council received the intelligence that Dr Sharpey desired to retire from the list of ordinary members, and anxiously considered upon what ground they were to recommend the application, which seemed to break a connexion of half a century's existence, fraught with so much reflected glory to the history of the Society. It was with quite a sense of relief that your Council learned that the retirement was in connexion with a proposal about to be mooted for the elevation of Dr Sharpey to the list of honorary members, and which technically required that his name should not be in the list of ordinary members. At the ensuing meeting for the election of honorary, foreign, and corresponding members, I need not remind you, this tardy act of just recognition of most brilliant talents and sturdy diligence was passed; but, alas! before the recipient of your gracious acknowledgment could be informed of your choice, the ruthless hand of Time had effaced him from the ranks of living workers in the field of science, and left alone such inscriptions of the legitimate esteem of his fellow-workers and admirers as you had but recently done your most to make indelible, to prove that his labours in anatomical and biological science were neither underestimated nor forgotten in the city and school of his early professional labours.

In another name, that of Dr Omond, has more recently been sounded out the knell of departed worth, once a president in this Society, and worthily holding his place along with the honoured names of Alison, Christison, Syme, Begbie, and others who had preceded him. Showing no want of professional attainment nor deficient interest in any department of medical or surgical learning, he was possessed in an eminent degree of great mathematical powers, unequalled skill in the game of chess, business habits of remarkable calibre, a devotion to all the projects for the amelioration of the condition of the poor and destitute, from first to last an enthusiastic and wise office-bearer of the Medical Missionary Society of this city. We must all deplore his loss as a much-loved man among the members of his own profession.

Another former president has been taken away from amongst us during the past session—one who, full of years, had comparatively at a late period of life been elected to the honourable distinction of occupying this chair. If the honour were a deferred one, due to causes accidental rather than personal, no man was more worthy of such a distinction than Dr Handyside, as possessing for a great part of a lifetime a European reputation as an anatomist and a surgeon. He studied his profession in the second decade of the century, under circumstances most favourable to the cultivation of the scientific side of his medical education; and after a period of extended continental residence in Germany as well as France, he returned to his native city, where, as a scientific teacher of anatomy, as an erudite student, and as a great practical surgeon, he made for himself a reputation and gained for himself friends which should have secured for him almost any position he might have selected, whether as a practitioner or as a teacher, had only health been granted him. After a period of comparative retirement both from teaching and practice, when Professor Struthers of Aberdeen left the school attached to the College of Surgeons in consequence of his appointment to the anatomical chair in the great northern university, Dr Handyside again came forward as a teacher of his favourite science, and by a continued service of years of growing success as a teacher proved incontestably how little the active energy of former days had been diminished, and how constantly he had kept himself *au courant* with the literature of his favourite study. He was essentially an advanced scientist in anatomy, biology, and surgery in the earlier years of professional life, and the same ring of the scientific side of anatomy was characteristic of his teaching to its close. I believe he might lay more claim than most other men of this school to being learned and erudite in his profession. He had a great library, with the contents of which he was intimate, and there was hardly any subject connected with medicine upon which he could not give valuable information and afford correct references. He was a man of the most punctilious honour, and, while claiming little for himself, was ever ready to interpose in behalf of the credit and reputation of a colleague in the matter of priority of discovery or invention. In the earlier years of his connexion with this Society he had been a laborious member, and when he occupied the chair he was indefatigable in his efforts to elicit materials for meetings and discussion. He was always most anxious to render the influence he might be able to exercise in the Society available towards the closer social intimacy of its members with each other and with himself, and we cannot fail to remember the great social gathering he inaugurated during his presidentship, at which new inventions in surgery, medicine, and physiology were shown, together with the most modern achievements in the mounting of preparations and in microscopic demonstrations; nor can we refrain from mentioning the *Jubilee Chronicon*

which he read from this chair. Dr Handyside's reputation, so far as he himself was interested in its being perpetuated, will, I believe, be most permanently connected with the establishment of medical missions. The medical missionary dispensaries of this city, together with the inauguration of like institutions in other towns, will ever continue as monuments to his unselfish and unwearied labours.

Turning from these regretful memories of the past, let us consider the sum total of the work which has occupied the diets of the Society during the past biennial period. To our impromptu contributions I shall first turn, not only because they first engage our attention at each meeting, but because, I acknowledge, I look upon them with a degree of interest which their fresh character, their unpremeditated form, and the material with which they deal has always seemed to me to invest them. No doubt from time to time they have been objected to as intruding themselves upon the more formal and advertised business of the Society. Papers appear in the billets; they attract a special auditory interested in their subjects or in their author; and those who come to the meeting are occasionally disappointed because the paper never comes on, all the evening having been consumed in the exhibition of pathological and other specimens. To obviate such difficulties it was at one time attempted to separate the pathological from the other meetings, every second or third meeting being dedicated to the exhibition of such specimens. This did not, however, prove so successful, when practically tested, as might have been hoped, and evenings occurred again and again when there were no specimens or no auditors, or but little of both, or sometimes even an overflowing collection of specimens and no one to show them. I recollect on more nights than one, when this plan was adopted, that a specimenless meeting was eked out by medical news, with remarks of a desultory character. Of recent years the divorcement of the written communications from the pathological and other less formal statements has been annulled, and during the two last years they have run on *pari passu* without occasioning any injustice to the written papers, and without any undue repression of the specimens, which I believe I am correct in saying have formed an important and interesting element in both sessions. I dare say an event of a few sessions ago with reference to pathological specimens may not be forgotten by the Society. There had been a more than usual number of these exhibited on some occasion, when the first paper was reached only at a somewhat late hour in the evening, while other communications had to be postponed. In the first issue after the meeting of a metropolitan medical journal, allusion in a sneering tone was made to this fact by their Edinburgh correspondent, who spoke of members of the Society competing in the exhibition of their museums, which, if interesting in themselves, might be reserved to a convenient season rather than

interfere with the regular business of the evening. So tender and sensitive, evidently, were the feelings of those members who did show specimens, that, certainly during the remaining evenings of that session, no pathological specimens were shown, and I think I may say with some truth that this department of the Society's stated business has never again regained the same degree of active vitality which it showed before this biting blast was emitted by the unknown correspondent of the southern luminary. Recent specimens, whether anatomical or pathological, have an interest certain to be accepted only if displayed in such a manner as when handed from one to another to tell their own story, without requiring manipulation. To deprive the Society of the opportunity of seeing such specimens in as recent a condition as may be possible, as the relegation of them to special pathological evenings would imply, would certainly detract from their interest and significance. Patients, too, who are only available for exhibition and examination at uncertain periods, must either be shown at the first ordinary meeting, or the Society must be deprived of an opportunity of seeing what is unique which may never occur again in a lifetime. I confess I regard these exhibitions as adding to our ordinary gatherings much the same lively interest which one finds in a clinical lecture, properly so-called, as contrasted with a systematic lecture, with which the reading of the regular papers may be more reasonably compared.

The exhibits during the past two sessions amount to 119 specimens, classified as follows :—

Patients, ...	19
Anatomical and morphological specimens, . .	6
Microscopic specimens, photographs, casts, and drawings,	14
Chemical preparations, medicinal agents, and poisons, .	2
Instruments and mechanical contrivances, . .	2
Graphic delineations, ...	4
Pathological specimens, ...	72

To recapitulate at length the interesting *viva voce* details which afforded a lively commentary upon all these specimens would be out of the question, as it would really in effect be nothing else than re-reading the minutes to which you have already set your seal. A brief *résumé* of the special features of interest in each class may, however, recall some of the details which occupied the successive meetings, and revive while it recalls the interest you displayed in this part of our programme.

The first specimen to which I may recall your attention is the one of *ichthyosis hystrix, verrucosa,* or *cornuta,* shown first in this Society in May (5th) 1880 by Professor Sanders as the same case exhibited before the Clinical Society of London (by Dr Crocker) in 1879, when under Dr Tilbury Fox's care, and described in the *Lancet* (10th May, 1879) and *British Medical Journal* (24th May 1879). This same patient was shown again by Professor Grainger

Stewart on the 5th January 1881 to illustrate the beneficial effects obtained by chrysophanic acid treatment.

Another interesting and rare cutaneous affection, *molluscum fibrosum*, was brought under the notice of the Society, at the meeting of 7th January 1880, by our most energetic and painstaking treasurer, Mr Joseph Bell, when we had the advantage of a critical memoir on the disease by our skilled specialist in dermatology, Dr Allan Jamieson.

Dr Cadell's interesting example (3rd March 1880) of a primary syphilitic sore contracted by a mother from her daughter, who had been confined, and who was at the time covered with an eruptive syphilitic affection, afforded matter for regret in so far only as the history in this case did not go back one stage further, as respected the condition of the infant and the condition and antecedents of the reputed father of the child.

The remarkable and characteristic case of myxœdema in a man of fifty (5th January 1881), following in the course of a rheumatic fever, and in which, in addition to his heavy expression, his swollen skin, spade-like hands, dragging gait, slumbrous speech, and sense of numbness all over the body, there were lumbar pain on movement, stertorous breathing, slavering lips, and defluvium capillitii, weakness and slowness in walking, almost amounting to incoördination, diminished reflex movements, and abolition of "tendon reflex," but without appreciable loss of sensibility, formed an exhibit of special interest.

On the first December 1880 Dr James Ritchie, instead of Professor Grainger Stewart, showed a very remarkable case of *hemiatrophia facialis* in the person of a German, æt. 42, whom Professor Gairdner of Glasgow, who was present, explained was the identical case described by Romberg in 1847, and stated that he had made an exhaustive comparative survey of the case, founded on Romberg's data, while he had obtained a good illustrative photograph of the case, as well as a cast of the palate.

At the same meeting (1st December 1880) Dr Brakenridge showed in the person of a girl æt. 19 a peculiar and interesting cataleptic condition of the right forearm and hand, persisting for 9½ months, to which he appended a verbal statement replete with interest in a clinical point of view as bearing upon the differential diagnosis of these cases, and in which his characteristic analytical and penetrative power was most markedly developed.

On the 21st March 1881 Dr Grainger Stewart showed a patient in whom the condition of exaggerated tendon reflex was well marked. The case was one of brain lesion with secondary degeneration, and illustrated well the conditions which constituted the essentials of the mechanism of this symptom.

On the 7th July 1880, and again on the 2nd March 1881, Dr Grainger Stewart showed an interesting case in which patches of spontaneous ecchymosis, due to subcutaneous hæmorrhage, and

confined to the eyelids, and in which defluvium capillitii, chronic laryngitis, a feeble heart, and general muscular weakness occurred as complications.

On the 1st December 1880 Dr Brakenridge showed a most curious phenomenon in a case of aneurism of the arch of the aorta, which, while it arrested the palpable pulse in the primitive carotids and brachials, was not attended by any evidence of want of blood in the head and neck or upper extremities.

The patients illustrative of surgical conditions which were exhibited to the Society were eight in number.

First, there was Mr Joseph Bell's case of stellate fracture of the patella (7th April 1880) occurring in a boy æt. 12, where with antiseptic treatment the joint was freely opened, washed out, and drained, and where not only had the fracture united soundly, but the normal conditions of the joint were restored as regards mobility.

Upon the 4th February 1880 Dr Cadell showed a little girl who had two years before suffered from suppuration of the ankle-joint, and where the local conditions were so threatening that amputation of the foot was advised. The abscess was opened without antiseptics, which were not employed throughout. The recovery was complete, with just a trace of stiffness.

At our meeting of the 2nd March 1881 Mr Chiene exhibited a patient most interesting to myself, as it reproduced precisely the conditions and results of a case in which I had operated a year previously with a like satisfactory success. Mr Chiene's case was a male patient in Dr Brakenridge's wards; in my own it was in an elderly lady. In both the condition was one of tetanoid spasm of the left sterno-mastoid muscle, in both the spinal accessory nerve was cut across, and in both with a successful result in arresting spasm and relieving the other secondary muscular disturbances.

On the 5th April 1880 Dr Wyllie showed a most curious result of tracheotomy, practised on a child for obstructive papilloma of the glottis. After wearing the tracheotomy tube for eighteen months the growth was found to have entirely disappeared, and by degrees the voice had been entirely restored, a fact vocally illustrated by his rendering of a verse of the "Happy Land."

Dr Hamilton's most curious and interesting exhibition, at our meeting of the 5th January 1881, of a patient from Chalmers Hospital in whom he had practised the method for which he suggested the title of sponge-grafting, in which a sponge introduced into a wound and retained there became, *first*, impenetrated by granulation tissue, *second*, absorbed, and *lastly*, covered in by cicatricial change in the granulation tissue. These phenomena, unlike the so-called organization of blood-clot, came to be effectuated without the interposition of any antiseptic agency.

Dr Finlay's case, shown on the 2nd March 1881, in illustration

of the results in a case of trephining on account of severe injury of the frontal bone, bore out the contention that reproduction of bone takes place in some such cases to a greater extent than is very generally believed. The issue of the case after so serious an accident, where the patient was fit for laborious physical exertion in the daily exercise of his calling as a dock porter, testified to the skill and ability with which the treatment must have been conducted.

Dr Macgillivray's patient, shown upon the 1st December 1880, where he had removed an extensive epithelioma from the cheek, including the antero-external wall of the antrum, to which it was attached, and then atoned for a gap the size of the palm of the hand by a skilfully executed plastic operation, was certainly a triumph of artistic manipulation.

During the past two years—of chemico-pharmaceutic preparations and poisons we have had . . 2 exhibits.
Of mechanical contrivances, } . 2 "
Of surgical and scientific contrivances, }
Of graphic methods of delineation, . . 4 "

In all, in this class, . 8 exhibits.

The medicinal preparations were so recently the object of interest as hardly to need more than a passing allusion. It was at our last meeting, on the 7th December 1881, that Dr Allan Jamieson showed two specimens of the salve muslin invented by Dr Unna of Hamburg. The one was salve muslin, the other plaster salve muslin. These obviously formed cleanly and convenient applications, fitted to save time in effecting dressings in which unguents were employed.

The poisonous preparation was a specimen of wall-paper, shown by Dr Foulis on the 7th July 1880—a green and white paper, which had occupied a drawing-room wall for twenty-eight years, and which it was presumed had occasioned illness of most varied kind in every member of the family. The paper was found, by calculation from an analysis, to contain still enough arsenic to poison a thousand persons, but Dr Foulis regretted he could give no comparative statement of the loss in arsenic from the paper during these twenty-eight years.

On the 7th January 1880 our most ingenious member, Dr James, showed to the Society an instrument for the graphic demonstration of the co-ordination power of the muscles in maintaining equilibrium. By a pair of revolving tambours connected with a pair of receiving tambours, the movements were seen to be communicated, and tracings obtained. Specimens of these tracings in healthy persons and in cases of locomotor ataxy, chorea, etc., were exhibited and described.

Dr Wyllie exhibited and described, on the 1st December 1880, a new form of battery for medical use, in which the special feature

was the mechanical rheophore invented by himself,—an instrument by which interruptions and reversals of the galvanic current could instantly be effected, as well as alternations of the galvanic and faradic current. This rheophore, as explained and its operations demonstrated, was found to work perfectly, and to be a model of ingenuity of design with simplicity of execution.

At the meeting of the 5th January 1881 Dr Kirk Duncanson brought before the members of the Society four new additions to the armamentarium of aural surgery, the invention of Dr Samuel Sexton of New York, consisting of—1, two pair delicate meatus forceps; 2, an oroscope; 3, a nasal speculum; 4, an aural powder-insufflator. These instruments were of American manufacture, and beautifully modelled and finished.

Dr Foulis's beautiful and effective demonstration of the circulation in the web of the frog's foot by means of the lime-light microscope, where the enlarged image was thrown upon a transparent screen, must have impressed every one who had an opportunity of seeing it at our last meeting (7th December 1881), as illustrating a new and most effective means of rendering such microscopic phenomena demonstrable to any number of persons at the same moment.

Dr Byrom Bramwell's series of graphic representations of cardiac sounds and murmurs, the distinctive feature in which was that the normal time relations of the sounds and silences on the cardiac cycle were preserved, attracted much interest even among the otherwise very important subjects which occupied the meeting of the 3rd November 1880.

On the 3rd of November Dr Wyllie exhibited a series of tinted lithographic charts intended to represent the fundus oculi as seen by the ophthalmoscope. These were so prepared as to admit of the use of pen, pencil, or colour in recording intra-ocular lesions.

The anatomical and morphological specimens were six in number.

First of these deserving notice was the cyclopean monster exhibited on the 8th November 1880 by Dr Byrom Bramwell, by means of photographic reproductions.

Next, by Dr Foulis, the head of a uterine embryo at the ninth week, showing the mode of development of the soft and hard parts of the face, as bearing upon the morphology of hare-lip single and double, and the formation of the normal lachrymal sac and duct.

On the 5th of May 1880 Dr Foulis described and exhibited by means of a dissection of the parts, including the tongue, larynx, and pharynx, the employment of an instrument he had invented for treating the asphyxia of patients under anæsthetics according to Dr Howard's method. This instrument he had called the "*glossotilt.*"

At the meeting on the 1st December 1880 Dr A. G. Miller

showed a carefully made drawing of the vulva of a female in the Lock Hospital suffering from gonorrhœa and syphilis, but in whom there was an unruptured hymen. Dr Miller attributed this condition to the lax and mobile condition of the membrane, and he alluded to the bearings of such a case upon circumstances occurring in medico-legal practice. He also mentioned that the drawing was made by Mr J. Grant.

On the 8th April 1880 Dr Miller showed specimens of an incisor tooth with a well-marked crescentic emargination due to congenital syphilis.

On the 5th of May 1880 Dr Miller showed a series of specimens of post-mortem fractures artificially produced, illustrative of extra- and intra-capsular fractures of the neck of the femur and of fractures of the lower end of the radius, fitted to impress the observer with the character of these injuries, as well as the mode in which such accidents are produced in the living patient.

There were of microscopic preparations of disease shown at the meetings of the Society, . . .	9	specimens.
Photographs of pathological condition and the results of operations, . . .	3	"
Drawings and casts, ...	3	"
	15	specimens.

Four of these demonstrations were given by Dr Byrom Bramwell, to whom the Society has been laid under very great obligations for his most interesting, lucid, and carefully elaborated pathological illustrations of recondite nervous lesions. The *first* of these demonstrations, upon the evening of the 2nd March 1880, was a series of sections of the spinal cord at different points, from a lunatic suffering from miliary sclerosis combined with and dependent on what was probably a waxy degeneration of the vessels of the cord, which from its anomalous reactions was probably undergoing fatty transformation. The *second* was given on the 2nd February 1881, consisting of a series of sections and drawings from a case of sclerosis of the medulla oblongata, pons varolii, and cerebellum, which had been under his care for eight years, and in which the patient died from pneumonia. The *third*, on the 5th January 1881, was a demonstration of a series of microscopic preparations and drawings illustrative of the pathology of infantile paralysis. The *fourth*, on the 1st December 1880, was a series of microscopic sections and drawings illustrative of some points in the morbid anatomy of locomotor ataxy.

Dr James Carmichael, on the 2nd November 1881, in illustration of the tubercular affection of the meninges which he exhibited, showed microscopic sections demonstrative of their intimate structure.

Professor Simpson showed a photograph, 4th May 1881, of

Madame Cavalini, the first patient upon whom Porro performed his modified Cæsarean operation. The photographs showed two views of the patient and two views of the uterus which had been removed.

Mr Joseph Bell, on the 2nd November 1881, showed a cast of the arm of a patient who had sustained a fracture of the radius in an extreme degree, and in whose case the exaggerated deformity had been left unremedied.

Mr Chiene, on the 3rd November 1880, showed for Dr Paterson of Bahia a drawing illustrative of a peculiar disease known as "Ainhum" among the natives of Brazil. The Society had the advantage of Dr Paterson's presence, by whom the phenomena were described.

To Dr Allan Jamieson the Society were indebted, on the 7th April 1880, for a demonstration of the fungus of alopecia areata or tinea decalvans, in illustration of the views of Eichhorst of Göttingen. Again, on the 5th May 1880, Dr A. Jamieson showed a water-colour drawing of a warty induration of the skin, reported as a late tertiary syphilitic affection.

The other four microscopic and photographic illustrations of disease were, I believe, exhibited by myself, and were as follows: —3rd March 1880, microscopic characters of a case of subcutaneous nervous tubercle; 7th April 1880, microscopic characters of a case of adenoma from the parotid region; and, on the same occasion, microscopic specimens of a recurrent sarcoma from the lower jaw, and a fibro-cartilaginous tumour from the palatal bone. These specimens were cut and mounted by Dr D. Hamilton, to whom really the interest attaching to them was alone to be ascribed. A photograph illustration of the results obtained by a sub-periosteal reproduction of the nose served to illustrate its permanent prominence after the lapse of two years from the date at which I had performed the operation. A photograph of the case of adenoma of the parotid just alluded to was shown on the 7th April 1880.

Of pathological specimens, properly so-called, there were no fewer than 78 exhibits, as follows:—

Post-mortem specimens,	11
Tumours,	28
Calculi,	7
Hernia and hydrocele,	4
Bursal conditions,	1
Affections of the air-passages,	3
Eyeball,	1
Ear affections,	6
Amputations,	6
Joint affections and excisions,	8
Intestinal worms,	2
Cutaneous appendages,	1
	78

The pathological specimens derived from post-mortem examinations were as follows:—

On the 7th July 1880 Professor Spence showed a large axillary aneurism, with erosion of chest walls and scapula.

Dr James Carmichael, on the 4th February 1880, showed the bowels from a child, nine months old, who died from intussusception after six days' illness; and, upon the 2nd November 1881, tubercular tumours from brain of a boy, æt. 2½ years, with the microscopic specimens of the morbid tissue.

Dr Coldstream showed, upon the 2nd of April 1880, a very interesting specimen of the parts obtained from a case of strangulated femoral hernia, in which no relief followed the ordinary operation, apparently from adhesive peritonitis extending from the parts involved in the protrusion; and also, at the same meeting, a specimen of thoracic tumour, originating in the root of the left lung, and occasioning symptoms which had led to a diagnosis of pleuritic effusion.

Dr Cotterill, at the meeting of 20th June 1880, showed a specimen of fracture of the skull, with large, massive blood-clot, producing first symptoms of concussion, which merged into those of coma, from which the fatal result was attained.

On the 7th January 1880 Dr Miller showed the temporal bone and cerebellum from a patient who died from intra-cranial suppuration affecting the cerebellum. The case was one of long-standing suppurative otitis, in which a blow from a cricket-ball behind the ear seemed to have been the exciting cause of the fresh inflammatory departure. The free opening of the mastoid cells which Dr Miller had practised afforded only a temporary relief.

On the 2nd March 1881 Professor Simpson showed the uterus and ovaries from a case in which gastrotomy had been performed for removal of the ovaries six days before the patient's death. The operation was practised on account of fits of rhythmical movements of the nature of dancing mania. Death was due to suppurative peritonitis.

On the 7th December 1881 Dr Buist showed the thoracic viscera from a patient who died from pulmonary gangrene resulting from the conditions attendant upon malignant stricture of the œsophagus.

On the 4th February 1880 I showed a specimen of ruptured abdominal aneurism complicating the symptoms of gall stones; and, on the 5th May 1880, the kidneys of a patient who died with cirrhotic kidney on one side, and catarrhal nephritis, with abscesses containing micrococci, constituting a quasi-diphtheritis of the other kidney—a sequence of vesical catarrh.

The specimens of tumour exhibited amounted to 28.

Dr Joseph Bell showed, on the 7th July 1881, a most interesting specimen of osteo-aneurism of the ulna, resulting from an injury with sheep-shearing scissors.

Dr Cotterill, on the 2nd June 1880, showed for Professor Annan-

dale (α.) testicle affected with medullary cancer, removed from a patient æt. 45; (β.) enchondroma successfully removed from the scapula in a patient aged 22; (γ.) epithelioma of the hand successfully removed from a patient æt. 81; (δ.) malignant tumour of the tibia successfully removed by amputation above the condyles in a patient æt. 15.

Dr Miller, on the 7th July 1880, showed a cystic tumour removed by him from the inguinal region. The cysts were partially lined with columnar epithelium. From this fact it was concluded that the tumour probably originated in the structures of the round ligament.

Dr Cadell, on the 4th February 1881, showed a specimen of adenoma he had removed from the mammary region.

Dr Macgillivray showed the following tumours:—(α.) 3rd November 1880, two specimens of epithelioma removed from the lip and from the cheek. (β.) 2nd February 1881, an encysted hydrocele from the cord, removed by excision. (γ.) On the 2nd February 1881, the lower two inches of the rectum, including an epithelioma, successfully removed by excision.

My own exhibits in the department of tumours have amounted to 18 specimens:—

Jan. 7, 1880.	Specimen of sarcoma growing subperiosteally from the base of the lower jaw.
„	Epithelioma developed in the cheek.
March 3, 1880.	A penis amputated for epithelioma.
April 7, 1880.	Diffuse mammary adenoma.
May 5, 1880.	Cystic tumour removed from volar region of thumb.
„	Encapsuled spindle-celled sarcoma of mamma.
„	An adenoma from the parotid region.
„	A sarcoma growing subperiosteally from the lower jaw.
„	Upper jaw, with spindle-celled sarcoma growing from its palatal plate.
„	Half of the tongue, removed by the thermo-cautery on account of a rapidly growing epithelioma.
March 2, 1881.	Two specimens of lymphangioma of the tongue, in which the protruding portions were removed by means of the thermo-cautery.
Dec. 1, 1881.	Pedunculated exostosis growing from the metatarsal region of great toe.
June 1, 1881.	Recurrent spindle-celled sarcoma from groin.
„	Chronic abscess of epididymis and testis, with caseation, or so-called tubercular testis.
„	Recurrent spindle-celled sarcoma from the calf and popliteal space.

The specimens of urinary calculi exhibited amounted to seven.

Mr Joseph Bell showed three examples, all with interesting histories:—(*α.*) 6th July 1881, calculus the size of a bantam's egg, removed by the scoop from a case where the greatest diameter of the outlet was only two fingers'-breadth. (*β.*) On the same evening, a stone weighing 11½ oz., removed after death by the suprapubic operation. (*γ.*) A calculus from a child, removed by the ordinary lateral operation.

Dr Miller showed, Dec. 7, 1881, two calculi fitting into each other and polished by attrition, removed from the urethra by incision.

Dr Foulis, on the 3rd of March 1880, showed a small oxalate of lime calculus from a patient affected with uterine fibroid.

I myself showed two specimens—one upon the 7th July 1881, weighing a quarter of a pound, removed successfully by the lateral operation; the other, upon the 1st of June 1881, for Dr Mackay of Huevla, which, although an ounce in weight, had been spontaneously evolved from the bladder of a young girl æt. 16.

The specimens of hernia and hydrocele were five in number.

Dr Cotterill, on the 2nd June 1880, showed a hematocele sac excised along with the testicle in consequence of a non-curative result following tapping and injection; and, on the same occasion, the sac of a femoral hernia, with closely adherent omentum, removed in a case of irreducible hernia; while, on the 7th of July 1880, I showed two large masses of omentum removed from cases of inguinal hernia, and where closure of the inguinal aperture was effected by stitching. Again, on the 1st of June 1881, I showed another specimen, consisting of a large hernial sac removed in the radical treatment by stitching of a very large and irrestrainable inguinal hernia.

Bursal tumours, one. Upon the 7th of July 1880 Dr Macgillivray showed for Dr A. Thom, junr., of Crieff, large bursal sacs removed from the patellar region.

Specimens illustrative of affections of the air-passages, four. You cannot fail to remember Professor Spence's most interesting specimen, exhibited on the 7th July 1880, obtained from the body of a lad who died in consequence of the insufflation of a puff-arrow into his bronchus, and where ineffectual efforts had been made to effect its removal after tracheotomy.

The specimens of membranous masses expectorated from the bronchial tubes in a case of plastic bronchitis, shown by Dr Cadell on the 4th February 1880, and the very remarkable example of coloured sputa shown by Dr Sidey, 5th May 1881, must only need to be mentioned to be recalled to your recollection.

The melancholy interest which attaches to a case of unsuccessful tracheotomy rightly performed for relief from suffocation in diphtheria was markedly elicited in connexion with the specimen of this affection, involving larynx, trachea, and bronchi, in a case operated on by Dr Coldstream, shown Nov. 2, 1881.

The amputations exhibited were six in number.

Dr Miller, on the 4th Feb. 1880, showed an arm he had been obliged to remove on account of sloughing and hæmorrhage resulting from erysipelas.

The other five specimens were shown by myself, viz.:—

Jan. 2, 1880. A foot removed for gangrene following injury.

July 7, 1881. A foot removed on account of extensive caries.

Nov. 3, 1880. An arm amputated at the shoulder-joint on account of failure to obtain cicatrization after an extensive burn.

March 2, 1881. A foot amputated on account of extensive and destructive syphilitic ulceration.

Dec. 1, 1880. A limb amputated at hip-joint, by Mr Furneaux Jordan's method, for cario-necrosis of head and neck of femur.

The illustrations of joint diseases and excisions exhibited amounted to eight.

Mr Joseph Bell showed a large loose cartilage removed from the knee-joint on 2nd November 1881, where preliminary transfixion of the movable body with a needle was adopted to secure retention when the joint was opened.

Dr Macgillivray, on the 7th July 1881, showed for Dr A. Thom, jun., of Crieff, two specimens of excision of the elbow-joint.

The remaining five specimens were shown by myself. (α.) On the 7th July 1880, the external condyle and capitulum of the humerus, which had been broken off and detached so as not to admit of satisfactory adjustment, when a strong joint with free play resulted. (β.) 5th May 1880, the parts removed in a case of recent excision of the knee-joint. (γ.) Two knee-joints removed by excision. (δ.) 6th July 1881, a knee-joint excised for suppurative gelatinous disease.

Of eye specimens we had but a single example, shown us upon the 6th April 1881 by Dr Argyll Robertson. It was an interesting instance of a foreign body, consisting of a particle of steel, which had penetrated the globe, and, resting on the retina, had become attached to its surface. Preliminary efforts were made to withdraw the foreign body by means of the magnet, but as these failed, enucleation of the globe was had recourse to. The specimen showed the particle of steel as described, and a drawing made according to Dr Wyllie's ingenious plan exhibited the appearances as observed by means of the ophthalmoscope.

Dr Kirk Duncanson, on the 5th January 1881, showed to the Society the only pathological specimen appertaining to the sphere of purely aural surgery. This was an example of necrosis of the right temporal bone involving the labyrinth. The portion of bone had been removed from the meatus of a girl æt. 9, who had suffered from suppurating ears from infancy.

Of morbid cutaneous appendages, Dr Allan Jamieson showed an excellent example of *onychogryphosis* removed by evulsion.

Of intestinal parasites we have had two examples shown.

Dr Foulis showed a *Tænia mediocanellata*, 15 feet in length, passed by a patient under his care who had recently returned from Zululand, where this unwelcome inmate of the intestinal canal is prevalent among both natives and Europeans, and where the half-cooked meat and very impure water are supposed to be the source of infection.

Dr Church, upon the 2nd March 1881, showed a lumbricus 10½ inches in length, which had been vomited by a lady. From the symptoms it was inferred that the worm, developed low down in the small intestine, had gradually made its way up the alimentary canal to the stomach.

Gentlemen, this enumeration of exhibits serves to show that in the department of operative surgery and in that of scientific pathology the members of the Society have been neither backward nor uninterested, while it is a source of congratulation that neither in operative surgery nor in pathology has the stream flowed only through hospital channels, but that private practitioners and our brethren from the country, and even abroad, have not been forgetful of our interest in all that serves to illustrate any advance, whether in the domain of practice or of scientific investigation.

Turning our attention for a little to the more formal public business of the Society, I find the papers which have been submitted in the billets of meeting, and read and discussed, may be classified under these heads:—

Physiological,	2
Therapeutic,	3
Medical,	12
Surgical,	9
Cutaneous affections and syphilis,	5
Total,	31

The first physiological paper was communicated to us by Dr Hamilton on the 6th April 1881, upon "the Physics of Inflammation illustrated by Experiment." This paper is not likely soon to be forgotten by any one who was present on the occasion, when, by a series of most ingenious illustrations in the physics of analogy, every statement was reduced to the test of experiment, and the views maintained seemed to be most fully justified by demonstrated facts. The interest felt in this exposition and demonstration was sufficiently shown by the cordial vote of thanks of the Society formally accorded to Dr David Hamilton on the motion of Mr Chiene, seconded by Dr Angus Macdonald.

The other physiological paper was read by Dr James, upon the 20th July 1881, "On the Reflex Inhibitory Centre Theory." The author showed that the facts upon which was founded the theory of an inhibitory centre regulating and controlling reflex actions might

quite as reasonably be explained by supposing that the removal of the higher centres prevented the diffusion of nerve force. This theory, as illustrated by the determination of a mechanical equivalent of brain work founded upon the contractility of a muscle as gauged by a definite weight, before and after the removal of the brain, was discussed. The fact that a reflex contraction requires greater stimulus than a direct contraction was alluded to, as well as the absorption of force in the nerve-cells. The influence of the sheath of Schwann and the white substance as effecting an increase in tension was discussed, while the possible part played in the process of the direct absorption of the solar energy in animals by the nervous system was indicated and considered as a possible source of nerve-force. This paper originated a most lively and interesting discussion.

The therapeutic papers were three in number.

1*st*, Dr Brakenridge, upon the 1st June 1880, read an elaborate and most important communication upon the actions and uses of citrate of caffeine as a diuretic, in which the great practical conclusion at which the author arrived—viz., that the citrate of caffeine possesses a special power of stimulating the secreting cells in the kidney, while its effect as a vascular diuretic, if present at all, is very feeble—seemed to be abundantly justified.

2*nd*, Professor Fraser, on the 6th July 1881, read his exhaustive analysis of the inquiry he had recently conducted into the influence of salicine and salicylate of soda in the treatment of acute rheumatism accompanied with inflammation of the genito-urinary mucous membrane. The facts stated seemed to lead most legitimately to the conclusion that their influence was altogether negative.

3*rd*, Dr Carrick of St Petersburg, upon the 6th July 1881, communicated to the Society his most interesting and very complete account of the Koumiss cure. The very special opportunities Dr Carrick had enjoyed for studying the use of this remedy in its native habitat made every statement he emitted the more trustworthy, and elevated the praise of this remedial agent from the category of a mere advertisement of the biassed opinion of a manufacturer to the level of the record of an opinion founded upon a scientific basis of observation. This formulated opinion will no doubt encourage those who heard Dr Carrick's views upon the use of koumiss to recommend it as possessed of definite and well-observed therapeutic qualities. The interest attaching to the description of the life at Samara, in the Steppes, excited the hope that, as a new health-resort, with its koumiss cure, invalids who may be induced to go thither may reap results which they have found unattainable in localities nearer at hand and hitherto better known.

The papers upon medical subjects numbered twelve.

1. Dr Allan Jamieson's suggestive and carefully elaborated paper upon "Cleft Palate and Incisor Teeth, an Instance of Heredity,"

read upon the 7th April 1880, was recognised as an important contribution to developmental science.

2. On 5th May 1880 Mr E. S. Brander's interesting paper on "Diseases of the Andaman Islands" was communicated to the Society by Dr John Smith. Its very interesting observations upon the syphilitic complaints of the Andamanese, together with a *résumé* of the cases which had been under Dr Brander's care while in charge of the hospital in these islands, showed that, with keen powers of observation and comparison, this gentleman could be placed in no sphere of professional usefulness without making a good use of his opportunities for extending the area of his own knowledge, and without rendering his observation useful and available to others.

3. On the 2nd of June 1880 Dr James Dunsmure, jun., communicated a further note upon a case in which temporary loss of voluntary power was produced by a touch on the head. The paper not only contained the elements of precise and accurate observation of the further progress of a case already described, but elicited a most interesting and able discussion by those members of the Society whose special field of observation has been that of nervous diseases.

4. At the same meeting, Professor Fraser's exhaustive paper on "A Case of Malignant Disease (Sarcoma) of the Lung," in which the history, symptoms, morbid anatomy, and pathology of the diseased condition were most elaborately considered in the light of ripe clinical experience, formed a monument of clearness and skill well worthy of imitation.

5. On the 7th of July Dr Beck's very interesting paper upon a condition which may lead to fallacy in the diagnosis of abdominal aneurism, met the approval of all those members whose experience in the field of abdominal diagnosis gave them the best right to speak authoritatively on such a subject.

6. Dr Byrom Bramwell, on the 5th of January 1881, communicated his elaborate and most practical paper on the "Differential Diagnosis of Paralysis," in which his personal knowledge of the subject from a practical standpoint was quite as conspicuous as his reading and careful consideration of the views of others was enlightened and appreciative.

At this meeting (5th January 1881) Dr M'Bride, whose name is familiar among us in connexion with otology, gave us a medico-physiological digest of the "Pathology of Vertigo," in which he manifested quite as great an aptitude to deal with recondite physiological questions, as to apply the observations gleaned from familiar phenomena in practice to support the line of theory he had been led to adopt.

8. Upon the 2nd March 1881 Professor Grainger Stewart read his original paper upon "Peripheral Paralysis from Disease of the Nerves," which contained a detail of symptoms and pathological

lesions upon which his claim to be the discoverer of a new disease might very reasonably be maintained.

9. Dr Davidson's paper upon the "Acute Anæmic Dropsy" observed by him in the Mauritius was welcomed by all as the labours in a new field of an old friend, whose marvellous work in Madagascar as a medical missionary, a high officer of state, and last, not least, a great surgeon, must be fresh in the memory of all of us.

10. Nor were we otherwise than gratefully recognisant of the remembrance of our Society by Dr John Wortabet of Beyrout in his paper entitled "Notes of a Case of Severe Chronic Jaundice," in which recovery took place, with which we were favoured on the 6th of July 1881.

11. Dr Leslie's interesting demonstration of the application of the graphic method to the tabulating and collecting of details as to heredity in disease, was evidently a step in advance towards a means of securing accuracy in the comparison of cases and the exhibition of general results which had not hitherto been reached.

12. Dr Carmichael's paper, read on the same evening (7th December 1881), on "Some of the Sequelæ of the Acute Infectious Diseases of Infancy," was characterized by a sagacious capacity to grasp the salient points of a large experience, gained both in the arduous labours of private practice and in the more interesting sphere afforded by the Royal Hospital for Sick Children.

The surgical papers were nine in number.

1. The first surgical communication was read upon the 4th of February 1880 by Dr John MacWatt, Resident Medical Assistant, Glasgow Royal Infirmary, upon "Two Cases of Spina Bifida in the Cervical Region, treated by Dr Morton's (Glasgow) Injection of the Glycerol of Iodine," in which one was cured. The other died, after the lapse of some time, from hydrocephalus.

2. A most important paper by Mr Silk, communicated by Mr Chiene, was read to the Society upon the 3rd March 1880, entitled, "Note on the Cause of Death during the Administration of Chloroform." The circumstances in which this paper was brought before the Society need not be referred to. They were, however, of a kind which rendered a professional discussion of the subject of chloroform administration very desirable. The result was, I feel confident, most satisfactory to a very large meeting, the general tone of the discussion indicating no diminished confidence in chloroform, no increased fear in its application, no feeling that professional chloroformists were more required than heretofore to render its employment safe, and that in its use no apparatus was more effective or more safe than a common towel or a pocket-handkerchief.

3. A complementary communication to this, as Dr Foulis's paper of the 8th of July 1880 might be regarded, upon the "Treatment of Asphyxia during the Administration of Anæsthetics," was the subject of an interesting discussion, which only helped to inten-

sify the expression of confidence in the use of chloroform as the most satisfactory anæsthetic hitherto employed.

4. At the same meeting (7th July 1880) Mr Joseph Bell read his interesting Notes of a Case of Abscess in the Abdominal Cavity, in which the rarity of the case and its fortunate issue, attributable to the very sagacious treatment employed, rendered it a subject of marked attention.

5. Mr Annandale's most interesting and suggestive communication, of the 3rd November 1880, upon the "Radical Cure of Hernia with the aid of Catgut and Listerian Antiseptics," was felt to open up a new point of literary departure in the radical cure of hernia.

On the same evening (3rd November 1880) Mr Chiene read his very important paper upon "Bladder-Drainage." The plan of treatment advocated, having the sanction of successful trial, may reasonably be expected to modify very materially the prognosis and treatment of cases of vesical loss of power due to enlarged prostate or to stricture of the urethra.

7. On the 2nd of February 1881 Dr Symington read his paper upon the "Anatomical Relations of the Trachea in the Child"—a communication with an anatomical title, but with most important practical bearings upon the operation of tracheotomy.

8. Upon the 7th April 1881 Dr A. G. Miller's interesting communication on the "Epidemic of Erysipelas occurring in the Old Royal Infirmary in the Winter of 1879–80" was felt to be replete with practical suggestions.

9. Upon the 2nd November 1881 Mr Joseph Bell's "Note on the Treatment of Rupture of the Urethra" was communicated to us, in which, in those cases where the rupture was due to injury, he inculcated the necessity of never allowing a drop of urine to pass the sphincter vesicæ into the injured urethra for at least ten days, attracted general interest, and appeared to commend itself to the convictions of all present.

The papers on syphilis and diseases of the skin were five in number.

1. We had a most carefully elaborated communication from Dr W. Allan Jamieson upon "General Exfoliative Dermatitis," illustrated by clinical details of picturesque interest and practical therapeutic value. This paper was read on the 4th February 1880.

2 and 3. Professor Grainger Stewart, upon the 5th of May 1880, communicated—1. "Notes of a Case of Molluscum," by Surgeon-Major Kenneth Macleod, M.A., M.D.; 2. "Notes of a Rare Form of Elephantiasis," by David Playfair, M.B. Both cases were of curious interest, and both were pictorially illustrated in a manner to make that interest impressive.

4. On the 1st December 1880 we had a most interesting paper and consequent discussion upon the Contagious Diseases Acts by Dr Cadell, in which he arrived at the following formulated conclusions:—1. Syphilis is not a sufficiently serious disease to require any special legislation, and, even granting that legislation

were necessary, that these Acts, on account of their one-sided and unscientific character, are not fitted to grapple successfully with such a subtle disease as syphilis. 2. The Acts do not lessen the amount of gonorrhœa in the army and navy. 3. They have a beneficial influence in preventing non-syphilitic sores in the army and navy. 4. These Acts give too much power to the police, and are tyrannical. 5. They reduce the number of public prostitutes, thus tending to increase clandestine prostitution, and, as a consequence, disease, among the population.

In the discussions emanating from these communications we had most important contributions from different members to the information brought to bear upon the subject-matter of discussion. The members of the Society who took part in the discussions were as follows:—Annandale (3), Joseph Bell (6), Black (4), Brakenridge (4), Bramwell (5), Bruce (1), Buist (2), Cadell (3), Carmichael (6), Chiene (7), Clouston (3), Coldstream (1), Blair-Cunynghame (3), Duncan (2), Dunsmure (1), Finlay (2), Foulis (2), Fraser (3) Furley (1), Gardiner (1), Gillespie (1), Gray (1), Hart (1), D. Hamilton (2), Imlach (1), James (2), Allan Jamieson (10), Leslie (1), Macdonald (1), Macgillivray (2), Miller (5), Ritchie (1), Argyll Robertson (2), Sanders (2), Shand (4), Simpson (4), Sinclair (1), Smith (2), Spence (1), Grainger Stewart (7), Symington (4), Taylor (2), Watson (12), Wyllie (1). [1]

Let me say, further, that the number of new members who have joined our ranks during the two past years amounts to twelve names, while eight have been removed by death; that the addition to our foreign and honorary members has consisted in the elevation of Dr Sharpey to the honorary list; of Prof. Heger, Freiburg, Prof. Albert of Vienna, Prof. Esmarch, Kiel, and Dr Sayre, New York, to that of foreign corresponding members; and of Mr Spencer Wells, London, Dr J. B. Williams, London, Dr J. T. Banks, Dublin, Mr G. H. Porter, Dublin, and Prof. Pirrie, Aberdeen to the corresponding membership of the United Kingdom.

The only item of business which remains upon the minutes of the Society as a legacy to the ensuing session is the question of the publication of our Transactions. Dr Craig, at our last meeting, intimated his intention to move in this matter, and the success which has attended the efforts of the Obstetrical Society in this direction leads us to hope that a better memorial of the great work done in each year by this Society than such a cursory survey by your president may, by the conclusion of the session, be in the hands of each member.

Any success which has attended upon these meetings demands the most ample acknowledgments to the secretaries, to whose careful arrangement of the business your comfort and the smooth progress of the work have, as heretofore, been entirely due. To the

[1] The numbers within parentheses indicate the number of times during the two sessions each member took part in the discussion.

sage advice of the vice-presidents and council, so readily rendered me, my cordial thanks are gratefully accorded. To our treasurer your best thanks are, I am sure, heartily given.

Gentlemen, I fear I have wearied you by this *résumé* of your two years' work. I have now but one act to perform in bringing my duties to a close—that is, to thank you most sincerely for your placing me in this chair, for your uniform courtesy and kindly forbearance extended to me while I have attempted to occupy it. In retiring from it I can most conscientiously assure you that I feel, in the choice of my successor, you have committed your interests into the hands of one far fitter than I to do justice to the position, —one who was a man of professional distinction twenty-five years ago,—one whose name was as highly esteemed then as the author of papers on therapeutics as it is to day as an author and teacher,— one who has since made his mark in many a varied sphere of professional activity,—one, therefore, who, in presiding over your deliberations, will bring to bear upon any topic which may emerge the same golden experience, gleaned in other fields besides that of pure physic, in which we must ever regard him as occupying a prominent position in the van of pioneers who add new territory to the domain of enlightened medicine.

Dr Wilson, seconded by Mr Annandale, moved a vote of thanks to Dr Watson for his past services. This was agreed to unanimously, and conveyed to Dr Watson by the new President, Dr Balfour, who also returned thanks for the honour they had done him in electing him to the presidential chair.

Meeting IV.—February 1, 1882.

Dr G. W. Balfour, *President, in the Chair.*

I. *The President* moved that a suitable minute should be prepared, expressive of the loss the Society felt it had sustained in the death of Sir Robert Christison, and, further, that the Secretary should be instructed to send a copy of it to Sir Robert's family. Sir Robert had, it was true, considerably outlived the span allotted to mankind, but the Society could not but mourn his death as that of one of its best known and most prominent members and its oldest surviving Presidents, Sir Robert having occupied the chair nearly fifty years ago (1835).[1]

II. *Dr Foulis* gave a demonstration of the OXY-HYDROGEN LANTERN MICROSCOPE. This apparatus enabled him to show the

[1] Sir Robert Christison was elected a member of this Society in 1822, and there still survive two members of a similar standing, Dr Combe, also elected in 1822, and Mr William Brown, elected in 1821.

circulation of the blood on a very large scale, as also microscopical preparations. By it, also, he would be enabled to photograph any preparation he wished. The idea of having a semi-transparent piece of glass on which to show the rays of light passing through the lens came to him after witnessing the pictures thrown on the focussing-glass of a camera. By this instrument objects were seen, not by reflected, but by transmitted light. By its means, he thought, we should be able to photograph all microscopic objects that could be thrown on a screen. All that required to be done was simply to put a sensitive plate in the place of the semi-transparent glass, and thus the picture would be fixed. (The lantern was then put in action, and the circulation through the web of a frog's foot shown. The animal lay quite still, nothing being done to it beyond covering its head with a wet cloth. It was not curarized, as it was believed that would have been contrary to the law. The circulation in the capillaries, the blood-corpuscles, and the pigment cells were all clearly shown. Dr Foulis stated that it was possible to magnify portions of this picture by means of the microscope, and the blood-corpuscles could be seen greatly enlarged in this way.)

III. *Dr Allan Jamieson* showed (1.) a PATIENT with a peculiar affection of the palms of her hands—psoriasis palmaris, or exfoliative dermatitis. The patient, a widow, stated that the disease began first on the soles of her feet about eight years ago. A year after, the palms were affected, and the disease extended to the wrists. Since then it has remained in much the same condition. She has had a family of nine children. One of them had some sort of an eruption on its nates. A specific history was, however, difficult to ascertain. One feature of the case was its great intractability to treatment. He had tried tar, chrysophanic acid, calomel ointment, arsenic, and mercury, but nothing seemed to have done much good. There were no spots on the body in 1879, when she first came under his care ; but six months ago a spot of psoriasis appeared on the right knee, and another under the right elbow. The case closely corresponded in appearance to two of Sir E. Wilson's plates, showing what he called erythema syphiliticum palmare. (2.) A specimen of NODOSE HAIRS, given him by Dr Walter Smith of Dublin. They were removed from the head of a woman aged 19. There were alternate enlargements and contractions of the hair at regular intervals— a species of rhythmical atrophy of the hair of a peculiar character. The nodes were pigmented, the internodes were not. Treatment had produced no effect as yet. Otherwise the patient was in perfect health.

IV. *Mr Joseph Bell* had been asked by Dr Hamilton of Hawick to show the Society a somewhat trivial-looking SPECIMEN, which had, however, given the doctor and his assistant a good deal of trouble. The doctor was asked to see a child suffering from ob-

struction of the bowels. There was no hernia. He gave it a dose of castor-oil without effect. He then ordered his assistant to give it an enema. The enema-pipe could not be introduced into the rectum on account of some obstruction there. The doctor was sent for, and, after some trouble, succeeded in removing a small whinstone. There was no history as to how it got there. It was supposed it might have been inserted for some felonious purpose, but the more probable view was that the child had swallowed it.

V. *Dr Hamilton* read Professor Fraser's communication on

A CASE OF DIABETIC COMA WITH LIPÆMIA.

Since the important paper communicated to the *Edinburgh Medical Journal* in July 1879 by Professor Sanders and Dr Hamilton, very few additional facts have been recorded to confirm their theory that the fatal dyspnœa and coma of diabetes are due to lipæmia and fat embolism. With the exception of the cases they have described, the evidence bearing on this termination of diabetes consists of two cases mentioned by Dr Gamgee, and one by Dr Foster of Birmingham, which do not altogether support the theory, and of a case published by Dr Starr of Philadelphia, in which, on the other hand, the theory is amply confirmed by the demonstration of post-mortem appearances very closely resembling those described by Sanders and Hamilton. The statement of Dr Babbington in 1836, that the blood in diabetes is at times specially characterized by its milk-like appearance, may also be regarded as confirmatory evidence. The absence of a greater amount of confirmatory evidence—which has induced one of the most recent writers on diabetes to state that the data in favour of the theory are yet too few to make its acceptance justifiable—may find an explanation in the unusual occurrence of fatal dyspnœa and coma in cases of diabetes, or in the fact that fatal cases of diabetes may present these symptoms unassociated with the concurrence of lipæmia and fatty embolism.

As such cases have been recorded, it becomes of importance to add to the limited evidence now existing in favour of the view that lipæmia and fatty embolism may occur in some of the cases in which diabetes terminates with symptoms of dyspnœa and coma. It is for this purpose that we place on record the following case. It has, besides, a special interest in the fact that a demonstration was made during the life of the patient of the occurrence of an excess of fat in the blood, coinciding with the existence of coma and dyspnœa.

R. M., aged 35, a boot-closer, was admitted into Ward XXIII. of the Infirmary on the 7th of November 1880, with the symptoms of diabetes mellitus. Six months before admission he had noticed that he required to urinate more frequently than before, and very

soon afterwards he suffered from thirst, pain in the back, and sleeplessness. He obtained advice at the Richmond Street Dispensary, and improved under the treatment that was prescribed; but a fortnight before his admission to the Infirmary he caught cold, and relapsed into his former condition of weakness.

He is married, and has had seven children, four of whom are alive. There is no history of diabetes in any of his near relations. He has been always steady in his habits, and his occupation required him to be at work for ten or eleven hours daily.

At the detailed examination made on the 12th of November it was noted that the patient is a man 5 ft. 5 inches in height, with a pallid complexion, and somewhat emaciated, as he now weighs 8 stone, whereas his usual weight was 9 stone.

The skin is generally dry, but sometimes moist with perspiration. Teeth in pretty good condition. Tongue with a slight gray fur. Has an acid taste, and on examining the reaction of the buccal fluid it was found to be strongly acid. Has a constant thirst, which leads him to drink about eight pints of liquid daily. His appetite is good, but by no means ravenous, and he suffers from heartburn and flatulence after meals. The bowels are rather constipated. The condition of the abdomen and of the liver and spleen was found to be normal. He did not suffer from cough nor dyspnœa, the respiratory movements occurred about twenty-two times in the minute, and physical examination of the lungs revealed no abnormality. The pulse was small and soft, but not frequent, and the second sound of the heart was reduplicated at the base.

He suffers from slight dimness of vision, the cause of which was not ascertained further than that the existence of cataract was excluded. The other special senses and the central and peripheral nervous systems were functionally in a healthy state.

Micturition is frequent and unaccompanied with pain or any difficulty. Has recently passed from 200 to 270 ounces of urine in the twenty-four hours, and since his admission it has been of a straw colour, with a slightly sweet odour, an average specific gravity of 1036, containing an average of 21 ounces daily of glucose, and being free from albumen. Deep pressure over the right kidney causes a little pain. For the last six months patient has lost his sexual power.

On the following day (13th of November) patient commenced an ordinary diabetic dietary.

On the 30th of November he took, in addition, five grains of carbonate of lithia twice a day, which was continued until the 6th of March 1881; and during all that time he was, with a few exceptions, able to go about during the day, and frequently left the hospital for some hours to visit his family, who resided in town. The quantity of urine which he voided became considerably lessened, and his weight steadily though slowly increased, so that he regained his former weight of nine stone. The elimination of

glucose was materially affected. Under dietetic treatment alone, it became reduced from the previous amount of 21 oz. in the twenty-four hours to 19 oz. on the 9th November, and 18·48 oz. on the 12th of November; and during treatment with carbonate of lithia, it was still further reduced to 12·5 oz. on the 18th of December, and 8·8 oz. on the 6th of March.

On the 6th of March the treatment with carbonate of lithia was stopped, and in its place the patient received three phosphorus pills daily, each containing only 1–50th of a grain of phosphorus. As some diarrhœa occasionally occurred, the administration of phosphorus was every now and then interrupted for a day or two at a time; but with these exceptions it was continued until the 5th of April. During this period the quantity of urine became still further lessened, and occasionally amounted to less than 100 ounces in twenty-four hours.

Early in April the patient was exposed to cold, and on the 6th of that month the feet became œdematous, and the morning temperature rose to 100°·8. The amount of urine passed in the twenty-four hours fell to 82 ounces. It contained a trace of albumen and only $6\frac{1}{4}$ ounces of sugar. Some bronchitis, also, was found to be present. He was confined to bed and treated with external applications and the subcutaneous injection of 1–6th of a grain of nitrate of pilocarpine. On the 9th of April the œdema had disappeared, and 100 ounces of urine were voided, which, however, still contained albumen.

Early in the morning of the 10th of April—probably at some time between 3 and 5 A.M.—patient suddenly experienced great difficulty in breathing, with a feeling of so severe oppression that he said "he could have lain down and died." The night-nurse gave him a little whisky; but as his condition did not improve, the house physician, Dr Logan, was sent for at 8 A.M. He found the patient lying in bed in the ordinary recumbent posture, which had been maintained since the urgent symptoms appeared. He was breathing rapidly—34 times in the minute. The face and hands had a dusky, cyanotic hue. The breath had no very distinct odour, but it was somewhat ethereal, its character being marked by the odour of the whisky which had been given to the patient. The pupils were equal and rather small. The patient spoke slowly and a little indistinctly, and appeared to have an imperfect recollection of events that occurred a few hours previously. The pulse was weak, small, easily compressed, and at the rate of 154 per minute.

A little blood was removed from the finger. Its naked-eye appearance was peculiar. It was apparently quite as thick as normal blood, but was whiter in colour, presenting an appearance such as might have resulted from mixing together equal quantities of blood and cream. When examined with the microscope, it appeared totally disorganized, no proper cells being at first visible,

but a granular appearance occupied the whole field. In a short time, however, hæmocytes were detected, presenting their usual shape, colour, number, and arrangement; for although many of the hæmocytes lay detached on their sides, there were many well-formed though small rouleaux. In some cases the hæmocytes were marked by clear spots which seemed like nuclei, but were evidently oil globules. The leucocytes appeared more numerous than in normal blood, and a few of them were coarsely granular. Between, and occasionally around, the cells there was an immense number of granules and globules densely packed together, varying in size from a mere speck to bodies as large as a red cell, and presenting the usual refractile appearance of oil globules. There were also a few other bodies of the same size and looking like decolorized red cells. The addition of osmic acid stained the larger refractile granules of a dark green colour, but had no marked effect on the smaller granules.

The patient received, by subcutaneous injection, ℥ss. of ether at 8.15, which was repeated every hour, and also frequent doses of carbonate of ammonia and whisky by the mouth.

At 9 A.M. he was perspiring freely, and in a semi-comatose condition, but was still suffering from dyspnœa.

At 10 A.M. breathing was attended with less effort. The thorax was resonant in front, expiration was prolonged and bronchial in character, and there were no accompaniments. Behind, at both sides, there was dulness on percussion and a few crepitations.

At 10.45 dyspnœa was less urgent; the pulse was slightly stronger, at the rate of 142 per minute; the extremities were cold, and the patient quite comatose. He died at 11.30 A.M., or about seven hours after the commencement of the urgent symptoms.

Some hours before death an examination was made by Dr Gowers's apparatus of the number of hæmocytes and leucocytes. The former were found to number 5,680,000, and the latter 16,000, in the cubic millimetre.

The post-mortem examination was made on the following day by Dr Hamilton. Height 5 feet 4 inches; circumference at shoulders, 37¾ inches. Body well nourished. Rigor well marked, and lividity moderate in amount.

When the heart was exposed the coronary vessels were found to present a remarkable appearance, due to milk-white emboli of large size and considerable length, which gave many of the vessels the appearance of having been injected with plaster of Paris. The organ was flabby and anæmic, but otherwise healthy. The right side was loosely filled with pink blood, which, after removal, presented on its upper surface a thick white stratum. Similar characters were presented by the blood from the left side, though not so decidedly. The blood in both venæ cavæ had the same characters as that in the right side of the heart. Floating in the blood were numbers of white clots. Both pleural cavities were dry.

Between the upper lobes of the left lung there was a round patch, about the size of a five-shilling piece, of a milk-white appearance, and apparently situated in the substance of the pleura. On being incised, a substance like milk escaped from it. The lung contained a large quantity of pink blood, which became brighter pink on exposure. The right lung was in a similar condition.

The liver was not enlarged. Its substance seemed healthy, but the portal and hepatic veins both contained much pink-coloured blood.

The spleen presented a dappled appearance, due to its being anæmic in some parts, and to its containing in other parts the milk-like substance.

The kidneys were anæmic, and the capsule could be easily peeled off.

The vessels of the omentum contained in many places very long white emboli, which were apparently situated in the branches of the portal vein, and similar emboli were present in the intercostal vessels. The blood in the abdominal vena cava presented the same characters as that removed from the heart.

On raising the scalp, a white patch about the size of a five-shilling piece, and apparently caused by extravasation, was seen on the left side. The vessels of the brain, both arterial and venous, had a milk-white appearance. The brain substance appeared markedly anæmic.

All the viscera possessed an acetone-like odour.

A microscopic examination of the blood and of many of the viscera was afterwards made. The blood removed after death had much the same characters as that examined during the life of the patient, except that there was a greater number of what have been regarded as decolorized hæmocytes. The application of osmic acid, caustic potash, magenta, and other reagents showed that the blood contained oil granules and particles of albumen or fibrin in addition to the ordinary constituents. The blood-clot was also examined after hardening in Müller's fluid and spirit, and before and after the application of reagents. It was thereby shown to be composed of alternating layers of blood-cells and fatty matter, together probably with some albuminous particles, the whole being bound together by fibrin. The reticulated arrangement of the latter was rendered apparent by the addition of chloroform.

When sections were made of the liver, each lobule was distinctly visible, the centre being darker than the periphery. Microscopic examination with the aid of reagents showed that the vessels were filled with normal blood-elements, along with other unusual constituents, consisting of fat and albumen in the form of granules; and that fatty and pigmentary degenerations had occurred.

When the kidneys were examined, the whole of their blood-vessels—vasa recta, and glomeruli vessels—were seen to be distended with blood-cells, globules of fat, and smaller particles,

which were dissolved by acetic acid, and were probably, therefore, of albuminous composition.

Sections of the lung, under naked-eye inspection, appeared to have the tissues well filled with blood. Under a high power all the capillaries were found in a state of dilatation and intense congestion. In some parts the red cells were seen closely packed, so as to be distorted in their shape, but their colour was well preserved. In other parts of the vessels a translucent substance, generally in the form of minute globules pressed together, and a few granules, were seen. The globules were larger than those in the liver; indeed, in some of the vessels they had run together to form oily masses of the size of several red blood-cells. The parts of the capillaries containing the globules were occasionally more dilated than the other parts. The parenchyma of the lung presented no peculiarity.

The sclerotic, conjunctiva, iris, and retina all contained vessels filled with contents similar to those in the lung bloodvessels. The sclerotic and cornea were both blackened with osmic acid; and in the meshes of the latter were seen, with a high power, a few globules and granules, apparently fatty. They probably were conveyed there during life; but as similar globules were moving about, having escaped from the bloodvessels, it is impossible to be certain that all those seen in the meshes of the cornea had obtained an entrance during life.

At the post-mortem examination a small quantity of urine was found in the bladder. It was of a light straw colour, had a marked acetone odour, and was found to contain about 1-7th of albumen. The percentage amount of urea and of glucose present in it was considerably below that discovered in any examination made during the life of the patient. Microscopic examination of the grayish-white sediment which formed after it had stood for a short time revealed the presence of a few tube-casts and of an enormous number of cells of all the forms present in the urinary tract, along with some tesselated epithelial cells that had probably proceeded from the urethra.

To summarize the results of this examination:—In the blood there were found fatty matter, precipitated albumen, and a substance having an odour like that of acetone. The fat seems to have adhered largely to the sides of the bloodvessels, causing an obstruction in the flow of their contents, resulting in congestion and in extravasations of the vascular contents. The lung stasis thereby produced would account for the dyspnœa and cyanosis; and the cerebral congestion would probably cause coma, the production of which might have been aided by defective nutrition and by poisoning resulting from accumulation of effete matter and from the presence of acetone.

These may be regarded as the immediate causes of the fatal termination. The remote cause seems to have been exposure to

cold, one of the results of which was an inflammatory change in the kidneys, which interfered with their eliminative function, and hence the marked diminution in the quantity of urea, and probably of glucose, excreted. The evidence appears to point to the fact that the fatty matter so largely present in the blood was universally and equally distributed throughout the body. Its origin may in that case be reasonably assigned to some constituent existing in the blood, which had somewhat rapidly undergone transformation. The blood-corpuscles could not have produced it, for their number was not lessened.

The chemical relationship between glucose and fat is a very remote one, nor can albuminous matter be either rapidly or easily transformed into fat. An altogether satisfactory explanation, therefore, of the origin of the abnormal constituents present in this and in similar cases cannot be given from existing data. We can only advance hypotheses; and our contribution to these hypotheses is that from the glucose present in the blood the acetone was mainly derived, while the fatty matter originated from a transformation of the albuminous constituents of the blood-plasma.

The President said the Society must feel greatly indebted to Professor Fraser for his interesting paper. The most recent writer on the subject, Jænicke, held that acetone in the blood was derived from the stomach and bowels, and was due to imperfect digestion of the animal diet so commonly given in diabetes. So confident was he of this, that he declared that in all cases in which animal diet was given, acetone could be detected in the urine in twenty-four, or at the longest forty-eight, hours, by means of the burgundy red colour developed on the addition of the perchloride of iron. Acetone was believed to exist in the blood as an acetic ether (acetessigsäureäthyläther) derived from the stomach and bowels of those fed on a highly animalized diet. The fatty matter in the blood was probably due to the splitting up—under unknown conditions—of the albuminates in which the blood of such patients was so rich. The ether emulsionized this fat, which circulated freely during life, and it seemed highly probable that death was really due to acetone poisoning, and that the pneumonia of lipæmia and fat embolism were mainly post-mortem appearances due to escape of the emulsionizing ether. The subject was one of the greatest practical interest, and had an important bearing on the dietetic treatment of diabetes.

Mr Joseph Bell wished to say a word or two from a surgical point of view. It might be within the recollection of some of the members that a few years ago he ventured to diagnose during life a case of fat embolism after fracture. The patient was a strong man with a comparatively trifling injury, having fallen and broken his thigh-bone. He was drunk when brought in, but no alarming view was taken of his case. In the middle of the night he was attacked by

a condition just such as Dr Fraser described in his case, perhaps masked a little by the remains of his alcoholic intoxication. His blood was not examined, but the diagnosis was made of fat embolism connected with fracture. At the post-mortem Dr Hamilton found the blood loaded with fat. On thinking over this case and talking of it with Dr Fraser, the question came to be, what was the theory of the fat in the blood, and how could it be cured? His first theory was, that the medullary cavity of the thigh bone being opened into, and perhaps one or more of the nutrient veins being injured, the fat in that way got into the circulation. This, however, seemed a coarse and almost impossible way of explaining the occurrence. As to treatment, no one seemed to know what should be done. Injections of ether, of which house-surgeons were so fond, had little effect.

Dr Hamilton said that, with regard to the theory that the formation of the fat was due to the diet, all the cases of lipæmia (some four or five) that had come under his notice had been on the diabetic diet, and that the lipæmia had supervened while they were on it. A good deal had been written on this subject lately, and the views of the late Professor Sanders and of himself had been severely criticised. The chief objection seemed to be that many diabetic patients died comatose, without there being any apparent lipæmia in their cases. They all knew that diabetic patients died comatose from various causes. Where the patient suffered from disease of the lungs there was likely to be some dyspnœa and coma, but such a case was not to the point. In all cases of *panting dyspnœa* in diabetic patients coming on suddenly, where the air enters the chest freely but the blood is not oxygenated, he had been satisfied of the lipæmic condition of the blood. He had never made a post-mortem on any case of diabetes, whether dying comatose or not, without feeling the peculiar ethereal odour. In some instances the odour is not perceptible till some time after death. In certain cases it is somewhat acetic ("sour-beer" like, Kussmaul), but after the viscera have been kept twenty-four hours or so, or the blood enclosed in a bottle for a similar time, the ethereal odour becomes so striking that one cannot fail to notice it. The first case in which Dr Hamilton noticed the odour was under Dr Argyll Robertson's care, and it was not detected at the post-mortem examination. The viscera were sent to his laboratory and kept by him for twenty-four hours in a box. On opening the box the odour was so powerful that he remarked to his students that the patient must have been taking chloroform or ether just before death. The odour was due to acetone or some other ethereal substance, but it could not be said that the acetone was the cause of the diabetic coma. Dr Foster's experiments with acetone had been repeated, but the effects did not approach the state of diabetic coma. After a prolonged inhalation the animal might be made half stupid, but never totally unconscious. In two cases Dr Gamgee noted that, although the blood was

lipæmic, he could not find embola in the lung. Dr Hamilton could hardly conceive that it was possible for the oil to be present to so large an extent in the heart without having also found its way into the lung. He could quite understand that unless the organs were carefully examined the minute particles of oil might be readily passed over. It was only here and there in the preparations shown by Dr Fraser that a large embolon occurred. The greater part of the fat was very finely divided. The capillaries much more commonly contained a mixture of minute oil globules, and precipitated albumen. Given such an amount of a light material floating in the blood, it is a physical impossibility that the circulation could go on for any length of time. It was a well-known fact that in some animals, after a fatty meal, if blood were taken from a vein close to the thoracic duct and allowed to stand, a stratum of oil globules formed on the surface; but this was only a temporary occurrence, and the oil, after passing into the circulation, disappeared in some way as yet unknown. Where, however, there was present for a number of hours so much oily matter as that recorded in Professor Fraser's case, it was a physical impossibility that the circulation could continue. The whole virtue of the circulation was that the greater number of the particles in the blood never touched the vessel walls. If there were present a number of light particles which were pressed against the wall, the friction would soon impede the outflow of the blood to such an extent that the circulation must come to a close in process of time. He therefore held to the original theory of Professor Sanders and himself, that the cause of the dyspnœa in those cases was the obstruction of the circulation by the fat and granular matter in the blood, so increasing the friction that the blood became stagnant. In Dr Fraser's case the fact that there were fat embola in the vessels was visible to the naked eye. They could be seen in some of the larger vessels nearly an inch in length.

Meeting V.—March 1, 1882.

Dr George W. Balfour, *President, in the Chair.*

I. *Mr Joseph Bell* showed a PATIENT who had suffered for some years from disease of the ankle-joint, but whose foot he had been enabled to save by means of a free antiseptic incision. He thought it was comparatively rare that good results were seen in cases of joint-disease of long standing. This patient, a young lad æt. 19, had suffered from pain in the ankle for nearly five years. For the last two years the pain had been intense. He was unable to put his weight on it, and sometimes was even unable to sleep at night. The disease, he found, was entirely confined to the ankle-joint, and he was afraid amputation might be necessary.

After a consultation with Dr Duncan, he thought it advisable to try the effect of a free opening and thorough drainage under antiseptic precautions. The incision was made on the 1st of December. An ounce and a half of pus was let out, and a drainage-tube passed into the joint. The symptoms were at once greatly relieved. Patient remained in hospital about two months, and was sent out with the wound healed and a starch bandage on to keep the joint quiet. This was now off, and they could see that the movements at the ankle were almost perfect, and there was no evidence of disease—a very satisfactory result. The lad wished to go about without his crutches, but he would advise him to be very careful for some time yet. It was good to note failures as well as successes. Just about the same time he tried the same plan of treatment on a man a little older than this patient, but with similar symptoms. The result was not at all satisfactory, and he had to perform Syme's amputation, after which the case did well.

II. *The President* showed a CASE which he believed to be one of aneurism of the ductus arteriosus. He had already seen four cases of a similar character. The first had been many years under observation, and was first seen by Dr Begbie, senior, then by Dr Warburton Begbie, and by himself, and all three had arrived independently at the same conclusion. Another had been for some time in the old Infirmary here. She subsequently went to the Royal Infirmary, Glasgow, where a similar view was taken of her case, which Dr Wood Smith had published in the *Glasgow Medical Journal,* after exhibiting the patient at the Medico-Chirurgical Society there. The third case was the patient of a medical man in Edinburgh, who had promised to bring her before the Society. His present patient, a young girl, had not been admitted to the Infirmary for heart mischief, but while in the ward she was found to labour under several cardiac defects, apparently of congenital origin, and amongst them were those signs he regarded as distinctive of this form of aneurism. In the second intercostal space, close to the right side of the sternum, there was a limited but forcible pulsation. Over this pulsation a very rough purring thrill was to be felt, and a loud bruit was audible. This thrill and bruit were largely systolic, but also extended into the diastole, the one portion being separated from the other by a well-marked second sound. There was no affection whatever of the lungs, but the murmur was propagated through the aorta in every direction, not only onwards with the blood current, but upwards and backwards into both carotids and into the ascending aorta, apparently by means of vibrations of the coats of the vessel. There were other murmurs present in this case, the heart being otherwise congenitally malformed, but he would go more fully into the case upon another occasion. One object in exhibiting this patient was to recover a lost reference to a similar case published within the

last six years in a German journal, and quoted in an English one, along with a woodcut of the post-mortem appearance of the parts involved. He would be grateful to any one who would supply this reference.

III. *Dr Buist* showed the HEART and BRAIN of a man who died three weeks before from apoplexy. He was a brewer, 65 years of age, and had been under observation for four years. At the end of 1878 he suffered from repeated attacks of vertigo, two of which were so severe that he fell. He had also mitral disease of the heart, but there was no dropsy. At that time he was forgetful and slow of speech, but quite intelligent. About twelve months ago he had an attack of cardiac dropsy, which yielded easily to treatment. He had now become much more forgetful and stupid, but he knew what he was about. His mental state after this got gradually worse, until he became quite childish. Towards the end of last September he had an apoplectic attack during the night, and in the morning he was completely hemiplegic on the left side. He gradually recovered the use of his left leg, but the arm remained permanently disabled. His speech was indistinct, and his memory was nearly lost. This state of matters continued till the 10th of February, when he suddenly became comatose and sank. During his last illness the disease of the heart gave no trouble. Dr Buist attributed the symptoms to cerebral hæmorrhage or embolism, and expected to find cerebral softening on the right side. As far as his examination of the brain had gone, he had not found anything to account for the hemiplegia, the chief morbid appearance being marked dilatation of all the ventricles, which contained about four ounces of serum. The cone diameter of the mitral orifice was 0·6 inches. Further examination of the brain revealed the presence of an old apoplectic cyst, about the size of a pea, in the white matter of the island of Reil, on the right side.

IV. *Mr Chiene* showed a MECHANICAL TONGUE-DEPRESSOR, invented by Dr Fergusson of Peebles, and made by Mr Young. It was very useful in removing tonsils or performing other operations about the fauces. It consisted of a chin-piece and tongue-plate, the tongue-plate being fixed to a ratchet which was worked by means of a spring attached to the chin-piece. The instrument did not require an assistant or one of the operator's hands to keep it in position. Simple in application, not likely to go out of order, easily removed, it seemed to fulfil in a marked degree the essentials of a mechanical tongue-depressor.

V. *Mr Chiene* then read his paper on

CRANIAL INJURIES.

CRANIAL injuries have assumed a special interest since the investigations of Ferrier and others have been published. A careful

record of the symptoms observed during life, and a careful description of the injured areas when the cases terminate fatally, will throw light on a most interesting branch of cerebral physiology and pathology. Three cases have lately come under my notice, and, with the assistance of my late house-surgeon, Mr Dobie, and my present house-surgeon, Mr Gibson, the symptoms have been carefully noted.

These injured areas were in all three cases on the left side. In the first case the injury was in the parietal region; in the second, in the temporo-sphenoidal; in the third, in the frontal region. The first case recovered; the second and third terminated fatally.

Case I.—A. M., aged 7, admitted to the Royal Infirmary on the 1st of January 1881, sent to Dr Brakenridge's ward on the 19th of February 1881.

History.—At midnight on the last day of the year 1880 a bottle was thrown from a height of four stories, and landed on the vertex. The patient fell backwards, was picked up, and brought to the hospital. 12.30 A.M.—Partially sensible, cried when the wound was examined. Face pale; pulse 56; pupils equal, sensitive to light. Two scalp wounds were found, one over the left parietal eminence, another over the anterior superior angle of the left parietal bone. These wounds communicated with a depressed comminuted fracture of the skull (see woodcuts 1 and 2). The depressed area began in the middle line, half an inch behind the centre of the sagittal suture; it ran directly outwards for an inch, and then passed obliquely downwards and forwards for two inches. This depression was of elongated form, of the nature of a sulcus, in which the finger could be placed. In front of this sulcus a depressed area of circular form, and somewhat larger than a florin, could be felt. The fracture was treated antiseptically; catgut drainage and horse-hair sutures were used. 9 A.M.—Pale, apparently insensible. 3 P.M.—Wound dressed. Very free serous discharge, stained with blood. Extensive extravasation around left eye. 10 P.M.—Looked up, and appeared to recognise bystanders.

2nd January, 12 *o'clock midday.*—Sensible, but did not speak. Throwing about *left* arm, and clutching hold of bedclothes and sides of crib. Right arm and leg paralyzed.

3rd January.—Wound dressed. Left arm still thrown about; right arm and leg drawn up in a condition of spastic contraction.

4th January.—Quite sensible; can recognise people; understands what is said. Complete aphasia. Cannot at will protrude the tongue; when asked to do so, patient contracts his tongue. He protruded his tongue when coughing. Complete paralysis of motion of right arm and leg. Spastic condition of flexors of right leg and flexors of right forearm. Motor power of left leg impaired; plantar skin reflex diminished on right side, but tendon reflex normal. Right facial paralysis; spastic condition of facial muscles;

right angle of mouth drawn up; left arm thrown about in a restless manner; this symptom less marked than on previous day.

6*th January.*—Spastic condition of right side less marked; left arm less restless.

7*th January.*—Can protrude tongue with hesitation and difficulty; it is directed to the right side. Can say "Ay," and makes attempt to pronounce his name.

8*th January.*—Can speak with hesitation. Facial paralysis and spastic condition of both face and right arm and leg almost gone. Sensation normal.

12*th January.*—Has completely regained power of speech and protrusion of tongue. No motor power in right leg; little power in right arm; can move fingers of right hand slightly; wound nearly healed.

13*th January.*—Passive movement and friction to be employed twice daily.

15*th January.*—Wounds healed. Fair motor power in left leg, none in right; plantar skin reflex diminished on right side. No exaggeration of tendon reflex.

18*th January.*—Can flex his right forearm; motor power in right leg returning.

21*st January.*—Marked improvement in motor power of right arm and leg; can flex fingers and flex leg on thigh; slight power of supination and extension of forearm.

24*th January.*—Great improvement in movements of arm; can extend forearm fairly well; spastic contraction of left arm (?).

26*th January.*—Improvement in movements of right leg.

28*th January.*—Can elevate arm at the shoulder-joint.

3*rd February.*—Up and dressed, but cannot walk or stand alone.

5*th February.*—Muscles round right knee rigid.

9*th February.*—Apparent want of co-ordination of movements of right side.

15*th February.*—Movements of right arm and hand improved; want of co-ordination of right lower limb, flexors and extensors contracting simultaneously.

19*th February.*—Sent to Dr Brakenridge's ward. His condition was noted as follows:—Aphasia gone; control over tongue normal; left side normal; can flex right arm with difficulty; power of supination and pronation imperfect; rigidity and atrophy of muscles of right lower extremity; cannot bear any weight on right leg, therefore unable to walk.

Remarks (see woodcuts 1 and 2).—In addition to the depressed areas, there is little doubt that extravasation of blood occurred along the fissure of Rolando, extending down to oro-lingual centre and forwards into area 5. Clot in all probability less marked furthest from injury to bone. It is to be noted that the aphasia first disappeared, then the facial paralysis, and that the arm improved before the leg. Dr Brakenridge intends to publish

the future history of this case. It is also to be noted that on the second day the patient moved the *left* arm and leg restlessly, the arm and leg *on the same side* as the injury. In fact, this symptom is to be noted in all three cases at one or other period of their history.

Case II.—D. M., aged 25, admitted 12th February 1881. At 2 A.M. the patient was found lying on the ground and brought to the hospital. He was seen in the waiting-room, roused without much difficulty, smelling strongly of drink, gave his name; no external injury; walked out of the hospital.

At 4 P.M. (fourteen hours after first seen) patient was brought back to the hospital. 5 P.M.—Body and extremities warm; temperature 99°; pulse 60; respirations 16; unconscious; pupils equal, sensitive; conjunctiva of right eye insensible; left eye sensible. 7 P.M.—Slight right facial paralysis; partial impairment of movements of right arm and leg; left arm thrown about restlessly; could not be induced to speak; sensible to pain. 7.30 P.M.—Head shaved; painful spot on left side above ear. 8 P.M.—Ice-bag to head, and four leeches over left mastoid process; skin reflex less on right than on left leg; patient violent, with difficulty held in bed; restless movements of left arm and leg, and of head. 8.15 P.M.—Breathing laboured; deep inspirations; *great irregularity in heart's action.* 8.30 P.M.—*Free perspiration* over whole body. 9 P.M.—Pulse 56; respiration 31; very violent. 9.30 P.M.—Pulse 60; respiration 28; breathing very laboured. 9.45 P.M.—Apparently choking; by drawing forward tongue breathing relieved. 10 P.M.—Passed water. 10.15 P.M.—Pulse 62; respirations 21. 11.15. P.M.—Pulse 62; respirations 26; quiet; *free perspiration;* breathing more easily. 11.25 P.M.—Pulse 72; respirations 27; pupils unequal; left pupil slightly sensible to light; conjunctiva of left eye sensitive; *heart beating violently; pulsations evident in carotids, brachials, and radials, and in external jugular vein and in veins on backs of hands; pulse very irregular,* at intervals rose to 120; left side of body restless; partial paralysis of whole of right side. 11.40 P.M.—Pulse 90; respirations 30; convulsive twitchings of right side of face; breathing less laboured. 11.55 P.M.—Three leeches applied over angle of left jaw.

13th February.—12.35 A.M.—Pulse 140; heart beating violently; breathing easily. 12.40 A.M.—Pulse 80. 2 A.M.—Pulse 72; respirations 32; *profuse perspiration;* pupils irregular; cutaneous congestion; irregular breathing. 9 A.M.—No change during night; temperature 104°·2; pulse 108; respirations 32. 9.30 A.M.—Pupils equal, dilated, insensible; conjunctivæ congested. 11 A.M.—Comatose. 12.15 P.M.—Temperature 107°·4; pulse 160; respirations 5. 1.30 P.M.—Died, 36 hours after patient was first seen.

Temperature, 13 minutes after death, on left side, 106°·4; 17½ minutes after death, on right side 106°·4.

Post-mortem Examination by Dr Hamilton.—Extravasation under sheath of left temporal muscle. No depressed fracture.

Under calvarium, superficial to dura mater, a large recent clot pressing upon lower half of ascending frontal convolution, lower two-thirds of ascending parietal convolution, posterior half of first and second temporo-sphenoidal convolutions, marginate convolution, and angular convolution. Fissure fracture from foramen spinosum to point opposite centre of clot. Hæmorrhage into, and great congestion of both lungs. Other organs healthy.

Remarks.—It is matter of regret that trephining was not performed over tender spot above left ear. No fracture could be felt, and the evidences of tenderness were by no means marked. The irregularity of the heart's action and respiratory functions deceived me, and I was of opinion that the fracture, if present, extended across the base of the brain, and that the eighth pair of cranial nerves were pressed upon by blood-clot. The woodcuts (Figs. 1 and 2) indicate the exact position of the clot. Its size was so large that the whole brain tissue was pressed upon. Those important nerves were in this way indirectly interfered with; hence the early implication of the heart and respiration. The free perspiration indicated vaso-motor disturbance. It is to be regretted that no note was taken of sight and hearing, as the clot pressed upon areas 13 and 14 of Ferrier, which are said to be connected with sight and hearing.

Case III.—J. C., aged 51, admitted to the Royal Infirmary at 3.30 P.M. on the 11th of February 1881.

History.—Half an hour before admission the patient was struck by a pistol bullet on the forehead, $2\frac{3}{4}$ inches from the fronto-nasal suture, $\frac{3}{4}$ of an inch to the left of the middle line. On admission, one part of the bullet was found below the scalp; the remainder was discovered in the brain, 4 inches from the opening in the calvarium, at the post-mortem examination. On admission, seven pieces of bone were removed from the substance of the frontal lobe, 2 inches from the surface. One piece was removed at the post-mortem examination. After the removal of the fragments of bone the patient did well for fifty hours. Then a rise of temperature to 102°·8, with the escape of diffluent brain substance mixed with blood, took place. The patient complained of severe pain in the head. During the last twelve hours of life it was estimated that three tablespoonfuls of brain substance escaped. The patient died of inflammation of the brain, seventy-two hours after the accident.

Post-mortem Examination by Dr Hamilton Twenty-two Hours after Death.—Opening in scalp $\frac{3}{8}$ of an inch in diameter. The wound in the skull was situated $\frac{3}{4}$ of an inch to the left of the middle line, and 2 inches in front of the coronal suture. On removing the dura mater it was found that an extensive loss of brain substance in the left frontal region had taken place. The area of loss was circular, and measured $1\frac{1}{2}$ inches in circumference. All three frontal convolutions were implicated. The bullet was found

lying in the anterior part of the transverse fissure, slightly internal to the uncinate gyrus. To reach its destination the bullet had passed through the following parts:—The superior frontal convolution, half way between its posterior extremity and the anterior extremity of the brain, the corpus callosum, the anterior part of the lateral ventricle, and the corpus striatum. It lay in the temporo-sphenoidal lobe, close to the uncinate gyrus.

Symptoms observed during Life—Half an Hour after the Accident.—Patient semi-comatose; easily roused. Pulse 60. Temperature 97°. Unable to speak intelligently, but understood what was said, and made efforts to answer, but failed to form the words. Spastic condition of right arm, more especially of flexors of upper arm. Surface warm. Pupils slightly contracted; equal; answer to light.

Four Hours after Accident.—Spastic condition of right upper extremity; right lower limb normal. Right facial paralysis. Apparent insensibility of right conjunctiva. Left side of body normal. Semiconscious, and attempted to answer when spoken to; but either could not find the words or was unable to speak. Tongue protruded to right side. After the removal of the fragments of bone, patient made attempts to answer with thickly expressed words. There did not seem to be aphasia.

Fifteen Hours after the Accident the pulse was 78. More sensible; *quite intelligent.* Drowsy; occasionally breathing heavily. Right orbicularis more powerful than at previous examination. Both conjunctivæ sensible. Tongue protruded when asked, most markedly to right side. Spastic contraction of right arm almost gone; powerless, cannot grasp with right hand.

Twenty Hours after the Accident.—Can now grasp feebly with right hand. Speaks more distinctly. Right orbicularis stronger. Buccinators equal in strength. Tongue protruded to right.

Forty-four Hours after the Accident.—More intelligent. Speech improved; tells her name and age. Pupils contracted; equal; answer to light. Grasp stronger. When asked to touch her nose with right hand, she lifts her hand to left cheek, and then assists it with left hand. Right biceps still a little resistant. No paralysis of either leg. No increase of tendon reflex. Tongue protruded to right side; cannot carry it to left. Cannot open her eyes widely. When asked to follow finger held in front of her face, she can do so in every direction except to the right side, in which direction she cannot carry either eye beyond its mesial vertical plane; turns her head more easily to right than left. Pupils still contracted. (These symptoms indicate an interference with area 12 of Ferrier. See woodcut.)

Fifty-three Hours after Accident signs of inflammation showed themselves. Patient irritable; complained of pain in the head. Pupils more contracted; does not open her eyes to normal width; cannot shut right eye firmly. Right hand and arm quite free from spasm. No increase of motor power in arm.

FIG. 1.

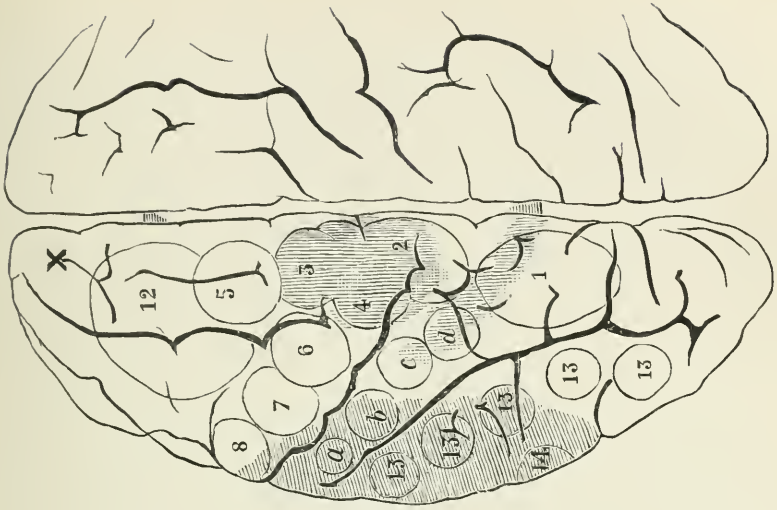


FIG. 2.

FIG. 1.—Upper surface of brain, after Ferrier,[1] indicating the motor areas and the injured areas in the cases just described.

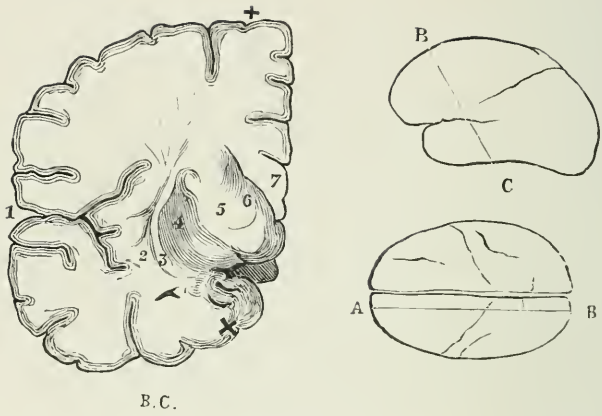
FIG. 2.—Lateral view of brain, after Ferrier, with motor areas and injured areas indicated.

The injured areas in Case I. have been shaded horizontally, implicating areas 1, 2, 3, 4, and *c d*. The shaded portion indicates as accurately as possible the areas of depressed bone. The position and size of the clot in Case II. is indicated in the temporo-sphenoidal area, and shaded *vertically*, implicating 8, 9, 10, 11, 13, 14, *a*, and *b*.

The aperture of entrance of the bullet in Case III. is marked by a ×.

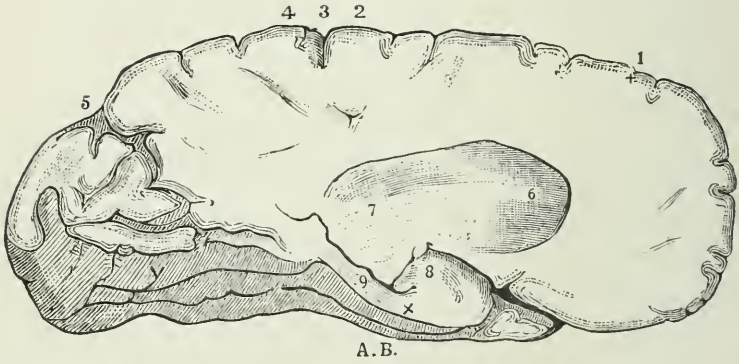
[1] According to Ferrier, the areas are as follows:—1, Lower limb on opposite side, as in walking. 2, 3, 4, Complicated movements of both limbs and trunk on opposite side, as in swimming. *a*, *b*, *c*, *d*, Prehensile movements of opposite hand. 5, Extension of opposite forearm. 6, Supination and flexion of opposite forearm. 7, 8, 11, Facial muscles of opposite side. 9, 10, Oro-lingual area on opposite side. 12, Elevation of upper eyelids, dilatation of pupils, turning of eyes and head to opposite side. 13, Vision. 14, Hearing.

FIG. 3.



B.C.

FIG. 4.



A.B.

FIGS. 3 and 4 are drawings by my pupil, Mr A. T. Thompson, of sections of a brain, to illustrate Case III.

FIG. 3 is an oblique transverse section through frontal region in line B C. The + at upper corner of section indicates point of entrance of bullet: the × at lower internal corner indicates position of bullet. 1. Silvian Fissure. 2. Claustrum. 3. External Capsule. 4. Lenticular Nucleus. 5. Internal Capsule. 6. Caudate Nucleus. 7. Corpus Callosum.

FIG. 4 is a vertical antero-posterior section in line A B, $\frac{3}{4}$ of an inch to left side of mesial plane. 1. Indicates entrance of bullet. 2. Ascending Frontal Convolution. 3. Fissure of Rolando. 4. Ascending Parietal Convolution. 5. Parieto-occipital Fissure. 6. Corpus Striatum. 7. Optic Thalamus. 8. Uncinate Gyrus, with × indicating situation of bullet. 9. Gyrus Hippocampi.

Sixty-three Hours after Accident.—Pulse 74. Temp. 100°·8. Opens her eyes when spoken to, but can only say "Ay" with difficulty when asked if head pains her. *Left* arm very restless; both flexors and extensors acting; sawing movement; grasping bedclothes with left hand. *Left* leg moved a great deal; the muscles brought into action as in walking. Right leg hardly moved at all. Right arm powerless and motionless. The patellar reflex greater on left than right side; very slight on right. Left leg offers more resistance to passive movement than right leg.

Sixty-six Hours after Accident.—Temp. 102°·8. Breathing stertorous. Pupils unequal; insensible; right pupil below medium size; left widely dilated.

Patient died seventy-two hours after accident. Great vascular dilatation of cheeks and chin for last two hours of life. Temperature ten minutes after death 101°·4.

Remarks.—This case may be divided into two parts:—1*st*, the symptoms observed during the first fifty hours, which may fairly be referred to the injury; 2*nd*, the symptoms from that time onwards until the death of the patient. The symptoms during the latter period were evidently connected with the inflammation which occurred as a result of the injury. The most interesting question raised in this case is, What relation had the track of the bullet to area 12 of Ferrier? There can be little doubt, if the symptoms observed by Dr Brakenridge and myself forty-four hours after the accident are studied, that there is a very striking clinical corroboration of the statement of Ferrier with regard to the functions of 12 area. The facts with regard to the movements of the eye are specially worthy of note. The opening of the eyes must be accepted with caution, as the woman had had "sore eyes," according to the statement of her husband. As regards the movements of the head, the case is opposed to Ferrier. There can also be little doubt that the bullet entered *in front* of area 12, and that in its track it must have undercut the area, dividing some of the fibres passing to the basal ganglia. From the symptoms it is also apparent that the areas 5, 6, 7, 8, 9, 10 were implicated directly or indirectly. Lastly, it is worthy of note that after the patient recovered from the primary shock, and until the symptoms of inflammation came on, she was perfectly intelligent; another case proving that the frontal lobe may be injured without interfering with the intelligence of the individual.

The President said the Society were greatly indebted to Mr Chiene for his most interesting and instructive paper. It was an attempt to unravel the physiology of the brain through surgical pathology, a mode of vivisection which no one could interfere with, and which was carried out on those animals in whose structure and functions they were most interested. He was specially interested in the direct venous pulsation noted in one of the cases. This was

primarily due to dilatation of the arterioles, depending in this case on shock. A direct venous pulse was, however, almost unknown in shock, because of the almost constant failure of the heart in such cases. In this case, however, there had been forcible pulsation of the heart, evidently due to irritation of the vagus, and the congestion and hæmorrhage into the lungs were obviously due to the same cause. The forcible heart-beat sent the pulse-wave right through the arterioles into the veins—a phenomenon with which they were sufficiently familiar in aortic regurgitation, but one which could not but be extremely exceptional in cases of surgical shock.

Dr Brakenridge said Mr Chiene had so exhausted the subject that little remained to be said. They were much indebted to him for the careful way in which he had brought the cases and the lessons they taught before them. It was not for him to say anything on the specially surgical points of the paper, but doubtless, by a proper attention to such symptoms as Mr Chiene drew attention to, and so by a careful localization of injuries, a field would be opened up for more efficient treatment. Such cases would tend to make localization more definite in future. They illustrated the opportunities surgeons had of confirming the investigations of physiologists on the lower animals, and also of correcting and adding to knowledge derived from that source. Indeed, if the anti-vivisectionists came to have their own way, they might be shut up to this method of acquiring such knowledge. He had had the privilege of seeing two of the cases with Mr Chiene, and could verify all that he had said. The only criticism he would offer was, that in his opinion the injured area in the case of the little boy was larger than Mr Chiene had represented it in his diagram of the adult brain. This case illustrated beautifully the correctness of Ferrier's observations. As the effect on the different areas passed off, the symptoms characteristic of irritation of these areas also passed off. He might say that the boy had been handed over to his care by Mr Chiene, that he was not altogether well yet, and he intended, with Mr Chiene's permission, to draw attention to some other features in his case on a future occasion. With regard to the third case, that of the gunshot wound, he thought Mr Chiene had not sufficiently emphasised the remarkably little interference with the intelligence. It was remarkable, considering the track of the bullet, that the woman was so intelligent. The other case, which he had not seen, was interesting as confirming the view that in the first case the facial paralysis, the aphasia, and paralysis of the tongue were due probably to the bloody serum passing down the fissure of Rolando. The movements on the same side of the body as the lesion were, he thought, probably due to a similar cause to those seen very often on the unaffected side in a hemiplegic attack, an irritation of the opposite side, rather than to any unknown communication existing between the affected side of the brain and the limbs on the same side. It was of importance,

he thought, that such investigations should be followed out by surgeons.

Mr Joseph Bell thought Mr Chiene's paper a model of what such communications ought to be. He agreed with what Dr Brakenridge said regarding surgeons pursuing such investigations, but he wished to point out that very often the lesions they met with were too gross to allow of such careful localization. A case had come under his notice a few days ago where a poor young gentleman, in a fit of depression, shot himself through the brain. He had held the pistol close to his forehead, so that instead of the track of the bullet being a nice narrow one, as in Mr Chiene's case, part of the powder had done its work of exploding within the cranium, and reduced a considerable portion of the brain, so far as could be made out by the finger, to a soft pultaceous mass. He removed several small portions of bone, and a piece of bullet that had been chipped off, from near the surface of this mass. He regretted to say that he was unable to tell them anything about the track of the bullet, as the friends refused leave to examine the head. It would hardly be credited that the Procurator-fiscal had yielded to the persuasions of the relatives not to order a post-mortem examination in a case that might have involved grave criminal proceedings. Every chance of a careful examination in such cases is of vast importance to enable us to give decided opinions when consulted in the witness box on similar cases of murder or attempted murder. As to the symptoms in the case, there was no indication of any paralysis whatever. The pupils were equal, the face was calm and quiet. There seemed to be a peculiar spastic condition of both hands. He died in a few hours, the temperature having risen in the meantime to 108°·4, and shortly after death to 108°·6. It might seem to put him in the position of an *advocatus diaboli* as regards Ferrier's areas, but he should like to ask how it was that sometimes very extensive lesions of the brain occurred without any of those symptoms mentioned by Ferrier being noticed. He had had under his care at least two cases in which, after extensive head injuries, a considerable portion of brain substance was lost, but in none of them were these symptoms observable. In one of the cases a day and a half of memory seemed to have been lost—*i.e.*, he did not recollect anything that occurred for thirty-six hours before he met with the accident.

Dr M'Cormack of Kentucky said he had listened to Mr Chiene's paper with great pleasure, not only on account of the intrinsic merit of the paper itself, but also as an additional evidence of the careful and painstaking character of the work done by the medical men of Edinburgh. The profession of this city had always exerted a great influence on his side of the water, and he was glad to say, as an American, that everything he had seen here went to prove that the glorious heritage left by Simpson and Syme was in worthy hands, and that even in the short space of time which had elapsed since

their day advances had been made and results secured of which they never dreamed. There was a fascination about the researches of Ferrier which none could escape who followed them, growing, no doubt, largely from the fact that they seemed to promise to throw light into a very dark field. He was free to confess that he had not improved opportunities presented by cases of injuries to the brain by so careful an analysis as Mr Chiene had done in the three cases he had detailed, and he was almost sorry to say that his cases had in the main seemed to have very little regard for these charts. While the paper was being read, he had called to mind a case which came under his observation a few months ago, where there was no sort of proportion between the extent of the injury and the symptoms produced. A healthy, strong man, aged forty years, was stooping in front of a circular saw, and had his head ripped open by it. The saw entered in the squamous portion of the temporal bone on the right side, and cut almost directly across to a corresponding point on the opposite side. The head must have rolled before the saw as it cut through, for the wound in the centre of the brain was not as deep as the angles of the external wound indicated. The membranes were torn away to the full size of the wound in the skull, and quite a furrow was ploughed through the cerebral tissue of both hemispheres. There was comparatively little hæmorrhage. A neighbouring physician had removed the spiculæ and rough angles of bone and dressed the wound; and when the doctor arrived a few hours later, the patient was half propped up in bed, playing with his child. The special senses were all intact, the mind was clear, there was no paralysis, not a symptom, in short, to indicate the fearful wound he had received. Inflammatory symptoms came on very slowly, and he remained in this negative condition for three days, at the end of which time he became comatose, and died without the development of any symptoms by which the brain lesions might have been located. He did not speak of this case because there was anything peculiar about it, but rather because there was not. Cases more or less like it were common in the experience of all surgeons, and all had been impressed by the variety of symptoms produced in different cases by wounds in the same locality, and by the frequency of wounds of the upper part of the hemispheres particularly, which, when not attended by pressure, produced no distinctive symptoms at all. For this reason we must not look for immediate results in these investigations. Their value would have to be tested at the bedside and by the careful comparison of a large number of carefully observed cases, and it was a question of years rather than months. As a contribution of this kind, and as a model for other observers, Mr Chiene's paper was a most valuable one.

Dr W. A. Finlay expressed his admiration at the clearness with which Mr Chiene showed the value of the different symptoms. One point referred to, viz., that symptoms of a severe injury to

the brain may be delayed until inflammation begins, called to his mind a case he had had under his care. He was asked to see a man who had received an injury some three days previously. His parietal bone was fractured, and spiculæ had been driven into the brain. He went to work the day following the injury, but felt drowsy and came home. On the third day he was in a state of high fever, and there was paralysis of sensibility and of motion on the side of the body opposite to that on which the injury had been received. He then trephined him, and pus escaped from the dura mater. He became conscious for a few hours, then comatose, and had convulsions on the unparalyzed side of the body. The temperature was high to begin with, and continued so till death. No post-mortem was allowed.

Dr Andrew Balfour would like to bear testimony to the extreme value of Mr Chiene's paper as inducing them to pay more attention than they had hitherto done to head injuries and symptoms. In mining districts they often had such injuries to treat. Some seven or eight years ago he had one very interesting case under his care. A young miner had been struck on the back of his head by a large piece of coal. All the soft parts sloughed, and the occipital bone was severely smashed. A considerable quantity of it was removed, and the brain was seen pulsating below. The patient lived some miles away, and he had not much opportunity of paying close attention to him. He recovered, but during the first fortnight of his illness developed strong maniacal symptoms, and also a great hatred for some for whom he had an opposite feeling previously. He was engaged to be married, but now the girl of his affection was regarded with extreme abhorrence. He was seen a few weeks ago, and the doctor found new bone developed in the occiput. He informed him (Dr Balfour) that he had not yet recovered his former affections.

Dr Graham Brown thought that in his last few remarks Mr Chiene touched upon what he considered was the most important point of all. The bullet had not touched the area 12 at all, but had, so to speak, cut under it or passed through the fibres coming from it, and yet the same effects were observed as though the area itself had been irritated. This he thought was very important in helping to come to a conclusion between the theories of Ferrier and Goltz. It might be remembered that at the International Congress Goltz showed a dog he had brought with him from Strassburg, in which the cortex areas were removed without apparently much affecting the animal. The question was whether the involuntary movements were due to action on the cortex or to involvement of the deeper structures, and these cases, he thought, helped towards the solution of it.

VI. *Dr Duncan* read his paper entitled

AN ACCIDENTAL EXPERIMENT WITH ANTISEPTICS.

It may seem, perhaps, a work of supererogation to put on record further proof of the value of antiseptic treatment; but there are so many difficult and apparently paradoxical facts connected with antiseptics, that whatever tends to settle the fundamental truth is worthy of note. The case I desire to bring before you illustrates rather the theory than the practice. It ought not to be forgotten that these are perfectly distinct and require separate consideration. The question of the antiseptic system of wound-treatment is frequently argued on both sides from a statistical point of view. Now, even putting aside the extreme fallacy of reasoning from limited numbers of cases in which percentages are seriously affected by trifling errors of forgetfulness or arrangement, and which are often far from *apropos*, it is evident that statistics can have little effect, from the multitude of disturbing causes, in determining the truth of the antiseptic theory. They may be used to illustrate, with more or less effect, the experience and care of the surgeon, his hygienic surroundings, the class of people he treats, the evils of hospitalism, and even the advantages of his mode of wound-treatment. But it is quite conceivable that the practice of the antiseptic system may be followed by the most beneficial results while yet the theory on which it is founded is a false one; and, on the other hand, it may be that the theory is profoundly true, while the practice based upon it may contain more of the injurious than of the beneficial, or may be injurious in some cases, beneficial in others, or, lastly, may owe what benefits or injuries it confers to some incidental chemical or mechanical or vital property, and not to its antiseptic qualities. We must work out the matter on two lines. We must first determine whether or not the difference between a compound fracture and a simple, a subcutaneous and an open wound, is due to the entrance of low forms of organic life in the one and not in the other; and, secondly, if that be determined affirmatively, we must discover the best mode of preventing their entrance. Notwithstanding many difficulties, I am unable to resist the accumulating scientific and experimental evidence in favour of the theory; and the case I have to lay before you seems to me to afford no loophole of escape.

Mrs C. M., æt. 45, was admitted to the Royal Infirmary on 14th June 1881, suffering from disease of the elbow and hip. There was a strumous and tubercular family history, but she had herself been a very healthy woman till six months before admission. Her left elbow had then, without known cause, inflamed and subsequently suppurated; and about six weeks before she came to Edinburgh her left hip had also become painful.

I found the elbow plainly in a quiescent state. The probe passed

down to a small portion of rough bone at the outer condyle of the humerus; but there was little discharge, and the joint was fairly movable. With rest and other treatment it ultimately recovered.

In the left hip there were all the signs of inflammation of the head of the femur, and a large abscess could be felt over the anterior and outer part of the joint. Extension and the long splint were applied, and I aspirated the abscess. The pus was found to be thick and a little flaky. Seventeen days afterwards a certain amount of fluid had again collected in the abscess cavity. I determined to aspirate the fluid a second time. There now happened a misfortune which I have not met with before or since, and which, therefore, is easily avoided. Immediately before using the aspirator in the patient whose case I am relating, I employed it to evacuate an abdominal abscess in a man suffering from diffuse cellulitis after amputation for traumatic gangrene. The pus from that abscess was found swarming both with dumb-bell bacteria and with micrococcus chains and groups. The instrument was externally cleansed and smeared with carbolized oil, but no antiseptic solution was passed through it; and I remember that, in order to make sure that the abscess in Mrs M.'s case was completely empty, I passed the blunt stilet through the canula.

This second aspiration of Mrs M.'s abscess evacuated three ounces of thin sero-pus. Neither on this nor on the former occasion were organisms found, though carefully searched for both before and after staining with aniline violet. But the result was very different. The first aspiration had been entirely and markedly beneficial. After the second the temperature rose slightly the same evening; next morning was 101°; next evening 102°·5; and the morning after reached 103°·5. During that time the abscess rapidly became more and more tender, red, and distended. I again aspirated, and got pus loaded with organisms precisely similar to those in the other case.

Immediately a small opening was made sufficient to admit the nozzle of a syringe, and having completely emptied the cavity, I injected a little chloride of zinc solution, 40 grs. to the ounce, which was allowed to remain a short time; and I then repeatedly over-distended the cavity with 1 to 20 carbolic solution.

An ordinary carbolic gauze dressing was applied, which required daily renewal for three days. The drainage-tube was then removed, and in three weeks (the dressings being changed once a week) the abscess had healed. No organisms were again found after the washing out. The patient ultimately went home cured on 30th October.

It seems to me that we have here a case in which, as distinctly as if the experiment had been deliberately made, phlogogenous and pyrogenous results followed the inoculation of septic matter, and in which the use of agents calculated to destroy the organisms which were found to have developed also put an end to these untoward accompaniments of their presence. It is difficult to avoid the

conclusion that there was here a relation of cause and effect. Nor would the case be vitiated by a failure to repeat the experiment in all its details. It is indeed unlikely that a similar treatment would frequently be equally successful, and it has risks which render the method in most cases of doubtful expediency. The success of the treatment will be rare, because the diagnosis of septicity is not always easy to make at so early a date, and because the crevices, sinuosities, and burrowings of abscesses generally render it difficult thoroughly to wash them out, and because later the surrounding parts become infiltrated with organisms. I am inclined, after many attempts, to think it impossible to render aseptic an abscess which has been long putrid except by scraping or cutting. Doubtless it is more feasible in abscesses which have recently become septic; but shortly after the case of Mrs M. I met with one in which I followed precisely the same method, and in which the risks of doing so were painfully illustrated. I had opened an abscess connected with the hip-joint in a lad of fifteen sent to the Infirmary by Dr Hardie. There were no organisms in the discharge, and it remained without them for some weeks. After one of the dressings, however, the temperature rose and local inflammation came on. Having ascertained the presence of organisms on the third day, I pursued with energy the treatment already detailed. It failed to destroy the organisms, and caused a rapid increase of inflammatory action, which ultimately necessitated amputation at the hip. The over-distention of the abscess cavity produced infiltration of the surroundings, and extensive cellulitis.

I am not prepared, therefore, to recommend the treatment which was followed; but I have thought it worthy of record as a very convincing proof of the truth of the antiseptic theory.

The President remarked that after the two papers they had heard that night there could be no doubt as to the scientific attainments and enthusiasm of our Edinburgh surgeons. As the hour was late, they would postpone the discussion.

Meeting VI.—April 5, 1882.

Mr Joseph Bell, *Vice-President, in the Chair.*

A letter from Dr Balfour, the President, was read, apologizing for his absence.

I. Postponed discussion on Dr John Duncan's paper on AN ACCIDENTAL EXPERIMENT WITH ANTISEPTICS.

Dr Miller said he thought it was sometimes an advantage to have a discussion postponed, because they very often had the opportunity of studying the *ipsissima verba* of the paper as

published. He had seen and watched with interest both the cases which Dr Duncan used as the text of his paper, and he could corroborate all that had been said. No two cases could be more thoroughly contrasted. After what they had seen, he felt that he would not like to run such a risk in any similar case of sepsis. The risk, he felt, was very great, because, if the abscess-cavity were burst, the irritating fluid and the sepsis were both spread into the cellular tissue, and things were made much worse than before.

Dr W. A. Finlay said it had occurred to him that the abdominal abscess from which the septic matter was got in the first instance might not have been affected by germs from the external air, and that therefore the case could not be held to prove that germs float about in the air, although it was clearly shown that the abscess inoculated from it was affected by germs from without. There was no proof that the putridity of the abdominal abscess was due to germs from the external air, and they all knew that there were many abdominal abscesses putrid in which there had been no external opening or evident communication with the air.

Dr Duncan thought it was hardly the proper time, when other important papers were coming on, to discuss such questions as Dr Finlay had raised. He might, however, state that in the primary abdominal abscess there was first a diffuse cellulitis from gangrene of the leg, the patient having refused amputation after a severe railway injury, till he saw the leg black, when he consented. An abscess formed after the amputation, which Dr Duncan opened, hoping it might be a sympathetic abscess free from germs, but which he found to contain bacteria and micrococci, both chains and rods. These had in all probability come from without. The only loophole of escape from this view lay in some experiments made by Rosenburger, in which he found that the products of bacteria, being injected, were able to produce septic mischief in the healthy lower animals. There were a number of curious points in connexion with this inoculation question which he hoped to bring before the Society on a future occasion. Dr Ogston had pointed out that in acute abscesses he had found micrococci chains, but not in chronic. He (Dr Duncan) found, however, that they were present sometimes in chronic abscesses, and absent sometimes from acute; and micrococci as well as bacteria were common in unopened abscesses. Another line of investigation was as to how they came there. Another line, again, was as to the value of the spray. Some experiments recently made seemed to show that it was of little value. It had been found that a considerable surface of sterile fluid might be exposed to the air for a considerable time (within an hour), then shut up and incubated, without showing the presence of germs. He also found, curiously enough, that the time required to make a fluid sterile was proportional to the mass of water. Thus, while

it took only twenty minutes' boiling to sterilize the fluid in a small beaker, two hours might be required to do the same with a large one. This seemed to disprove the idea that the character of the germs had anything to do with the time required for sterilization.

II. *Dr Blair Cunynghame* showed a boy æt. 12, suffering from PSEUDO-HYPERTROPHIC PARALYSIS. Along with his brother (æt. 10), he was sent to the Sick Children's Hospital from the south of Scotland, it being supposed that they both suffered from curvature of the spine. Dr Cunynghame regretted that he could not show the brother, as he was suffering from an attack of measles. In the case before the Society the disease was pretty far advanced, symptoms of it having been noticed five years previously. The patient was very weak, and could not raise himself from the ground when thrown down. The walk was very typical, as also the lordosis. The muscles chiefly affected were the gastrocnemii, tensor fasciæ femoris, and infra-spinatus, and, to a lesser extent, the soleus, extensor brevis digitorum, peronei, rectus femoris, and sterno-mastoid. The latissimus dorsi was greatly wasted. All of them acted to the Faradaic current. The patellar tendon-reflex was wanting, but the skin-reflex was normal. The skin was mottled over the affected muscles. Some measurements had been taken of the limbs in the two cases, and contrasted with others taken from healthy boys. The points of measurement were—(1) the circumference round the thickest part of the calf; (2) the circumference midway between patella and anterior superior iliac spine; and (3) at the level of the pubis. These, in the elder brother, were, (1) 12 in., (2) $12\frac{1}{6}$ in., (3) $13\frac{1}{4}$ in. respectively; in the younger, (1) 10 in., (2) 10 in., (3) $11\frac{1}{4}$ in. respectively; and in two normal cases, (1) $8\frac{1}{2}$ in., (2) $11\frac{1}{2}$ in., (3) 13 in. respectively. In the younger brother the disease was little more than commencing, and the mode of raising himself from the ground was very typical in his case. Dr Cunynghame had written to the mother, a very intelligent woman, to ask if she knew of any other instances in the family; but there was none.

III. *Dr Heron Watson* showed an UNDEVELOPED AND UNDESCENDED TESTICLE, WITH THE SAC, which he had removed a fortnight before from a patient over 40. The man had recently begun to suffer pain on the side on which the testicle had not descended. He also felt as if some body was endeavouring to come down at the time the pain was worst. The nature of the case was evident when an examination was made. He was, therefore, advised to submit to the removal of the atrophied testicle and sac, and so have the abdominal serous continuation into the inguinal canal cut off, thereby preventing hernia, to which he was liable in that condition. The operation had been done antiseptically, and the case had gone on well.

IV. *Dr W. A. Finlay* showed—(1.) THE ARM OF A CHILD he had amputated at the shoulder-joint, secondarily, for traumatic gangrene, the result of an injury. The child had been knocked down by a lorry eight days before the operation had been performed, and the arm was severely crushed by the wheel. In some portions the periosteum was stripped from the bone. The specimen was chiefly interesting as showing a longitudinal split in the humerus at some distance above the fracture, necessitating amputation higher up than at first seemed requisite. The operation had been done by Mr Spence's method, and the case was going on well. (2.) The HEAD AND NECK OF THE FEMUR, removed from a boy æt. 13, suffering from disease of the hip-joint, with a profuse discharge. Ulceration of cartilage, along with disease of the neck, was well seen. Since the operation the patient's temperature had very much improved.

V. *Dr Miller* showed three small preparations—(1.) A GLANS PENIS AND PREPUCE, amputated for epitheliomatous disease. The affection was not an uncommon one, but he ventured to show the specimen because the cause of the epithelioma—an adherent prepuce—was well seen. The moral was that adherent prepuces should be removed early. The patient had suffered from it from his boyhood. At the time of the operation the inguinal glands were on both sides much enlarged, indurated, and tender, but all irritation had subsided, and they gave no further trouble. (2.) A CYST OF THE ROUND LIGAMENT, removed about two months ago from a young woman. The history was pretty much that of a hernia, sudden pain and swelling in the inguinal region, but this swelling was only partially reducible. He therefore made up his mind that it was not a hernia, and operated for its removal. The patient made a rapid recovery. (3.) A POLYPUS OF THE RECTUM, which, at the time of removal, was as large as an ordinary raspberry, but had contracted till it was now about the size of a dried pea. He had put it in glycerine, thinking that it would contract less in that fluid than in spirits, but it seemed to have contracted more. In 1869 he read a paper on polypi of the rectum, in which he showed that there were three varieties of these tumours—glandular, vascular, and malignant. This specimen belonged to the first of these. It had been removed by the ligature.

VI. *The Chairman* showed A FOOT he had amputated by Mr Syme's method that morning. The patient was a boy æt. 14, on whom he had operated three years before for disease of the os calcis. For more than two years he had done well, but nine months ago the disease returned in the upper portion of the os calcis, the astragalus, and the joint between. The os calcis was larger in proportion than it ought to be, a great deal of new bone being thrown out to supply the place of that removed in the first operation.

VII. *Dr Gibson* showed some TRACINGS of the PULSATIONS OF THE BRAIN, taken from a patient with loss of the substance of the skull in the frontal region, in consequence of a kick given by a horse. The tracings showed the effects on the cerebral circulation of normal and forced breathing, of coughing, and of mental exertion. Dr Gibson stated that he hoped, at some future meeting of the Society, to present a full report of this interesting case.

VIII. *Dr Blair Cunynghame* showed the BRAIN from a case of acute hydrocephalus. The convolutions were very much flattened. There were two and a half ounces of serum in the ventricles, and the foramen of Munro was enlarged to admit the tip of the little finger.

IX. *Dr Gibson* read his paper on

THE ACTION OF THE AURICLES IN HEALTH AND DISEASE.

WRITING about thirty years ago, Stokes[1] says, "Although in most cases of dilatation of the heart we find the auricles as well as the ventricles engaged, yet our knowledge of disease as affecting the former cavities is very limited." During the three decades which have nearly passed away since these lines were penned, our knowledge of the conditions referred to by their author has greatly increased; and it is the intention of the following pages to discuss the action of the auricles from the physiological as well as from the pathological point of view, so as to attain a wide conception of the part which they play in the maintenance of the circulation under varying conditions. In doing so, only such matters of historical interest as are indispensable to the thorough comprehension of the subject will be touched upon.

When the anterior wall of the thorax is removed from any of the larger mammals, and respiration kept up by artificial means, we are enabled to follow and study the different phases of the cardiac cycle as they occur in succession one to another. Bestowing our attention more particularly upon the auricular systole, the following is the sequence of events which we may observe.

At the end of the diastolic pause rhythmic contraction is seen in the great veins, pulmonic as well as systemic, which open into the cavities at the base of the heart. These vessels are full of blood, and as the contraction passes along them in a peristaltic wave towards the heart the auricles are seen to bulge slightly. When this wave breaks upon the auricles, the auricular sinuses suddenly contract and approach the ventricles, their contraction being immediately followed by that of the appendices, which are drawn inwards. In this way the contraction of the auricles,

[1] Stokes, *The Diseases of the Heart and Aorta*, chap. iii. p. 273, 1854.

following that of the great veins, may be regarded, as Beaunis[1] suggests, as the last phase of the auricular systole.

The fact of the rhythmic contraction of the venous system, so important not only for the maintenance of the circulation in health, but, moreover, so valuable in diseased conditions, has for long been almost entirely ignored. In the works of Senac[2] and Haller[3] we find that the physiologists of their time were well acquainted with the action of the venæ cavæ and pulmonales, and that it was a matter of everyday observation that the superior vena cava continued to pulsate after the auricles and ventricles had become motionless. Yet during the closing years of last century and the first half of our own no such property was allowed to the great veins; as a matter of fact, in the ponderous memoir of Raciborski[4] the statements of Haller are categorically denied, and attributed to mistakes in observation.

The discovery by Wharton Jones[5] of the rhythmic pulsations of the veins of the bat's wing was of much importance, for it turned the attention of physiologists to the well-nigh forgotten fact that the venous walls have the power of independent contraction in situations requiring such aid. Now, by the observations of Colin[6] and of Lauder Brunton and Fayrer,[7] the subject may be regarded as beyond discussion.

During the auricular systole it seems as if two roads were open for the flow of the blood, either backwards into the great veins or forwards into the ventricles. In reality, however, it is not so, as the former path is rendered impassable by several conditions. The peristaltic wave passing down the venous trunks impels, as we have seen, the blood into the auricles, and then, before it has entirely finished, the auricular systole acts also from above downwards upon the blood. Further, the ventricles of the heart in the diastolic phase oppose not the least resistance to the influx of blood; in fact, apart from the diastolic untwist to be afterwards referred to, by their own inherent elasticity, and by the negative pressure caused by the pulmonary tension, they may be regarded as having an aspiratory action. Lastly, if in any way the pressure within the great veins becomes positive,—that is, above that of the atmosphere,—and there is a tendency to backward flow, any such reflux, as pointed out by Hamernjk,[8] at once closes

[1] Beaunis, *Nouveaux Eléments de la Physiologie Humaine*, tome ii. p. 1003, 1881, 2nd edit.

[2] Senac, *Traité de la Structure du Cœur, de son Action, et de ses Maladies*, tome i. livre ii. chap. 3, p. 310, 1749.

[3] Haller, *Elementa Physiologiæ*, tom. i. pp. 399 and 410, 1757.

[4] Raciborski, *Mémoires de l'Académie Royale de Médecine*, tome ix. p. 484, 1841.

[5] Wharton Jones, *Philosophical Transactions*, Part I. for 1852, p. 131.

[6] Colin, *Comptes Rendus*, tome lv. p. 494, 1862.

[7] Lauder Brunton and Fayrer, *Proceedings of the Royal Society of London*, vol. xxv. p. 174, 1876.

[8] Hamernjk, *Physiologisch-pathologische Untersuchungen über die Erscheinungen an den Arterien und Venen*, u.s.w., S. 239 u.f., 1847.

the valves of the jugular and subclavian veins, and so prevents any further regurgitation.

During the auricular systole, therefore, the blood can, under normal conditions, only flow in the one direction, and in this phase the ventricles may be observed to swell, while on feeling them they are found to become harder and firmer.

Under favourable circumstances the auricular systole makes itself heard, seen, and felt on the surface of the body. In a case of presternal fissure studied and described by Malet and myself,[1] the contraction of the auricle was accompanied by a low breezy murmur immediately preceding the first sound. And what we thus observe when the heart is in its normal condition may, in other states, become greatly exaggerated. When there is any impediment to the passage of the blood from the auricle into the ventricle, as from stenosis of the orifice or from its partial occlusion by tumour, the former cavity gives very definite evidence of its systole in the rough murmur preceding the first sound.

As a rule, the unaided senses of sight and touch are unable to appreciate the limited range of movement caused by the contraction of the auricular walls at the surface of the thorax, but all good tracings taken with the cardiograph show an elevation of the lever just before the ventricular systole. In this way we may measure the duration of the auricular systole. The case of cleft sternum referred to above allowed me to make some observations upon the relative length of each phase of the cardiac cycle, and I should like to mention very briefly the duration of the contraction of the auricles, which has been fully discussed elsewhere.[2] The subjoined woodcut is a copy of the tracing representing an entire revolution, with the time-register beneath it. This, in the original, is the curve made by a tuning-fork vibrating 100 times in a second. For the sake of simplicity, each complete excursion has been replaced in the woodcut by a verticle line. The wave between the dotted lines A and B is caused by the auricular systole, and it extends, as will be seen in the woodcut, over ten-hundredths of a second. This was the minimum duration of the auricular contraction in our case, and the limits between which it varied were ·10 and ·13 sec. In different revolutions it constituted from 8·8 to 13·7 per cent. of the whole cycle. As might be expected, its duration was much more variable than that of the ventricular systole, but it was more stable than that of the phase of ventricular diastole.

This subject would not be complete without a few words with reference to the intra-auricular pressure. Marey[3] found that the pressure in the right auricle was negative during almost the entire

[1] Gibson and Malet, *Journal of Anatomy and Physiology*, vol. xiv. p. 4, 1879.

[2] Gibson, *The Journal of Anatomy and Physiology*, vol. xiv. pp. 237–8, 1880.

[3] Marey, *Physiologie médicale de la Circulation du Sang*, pp. 100 and 103, 1863.

cycle; this negative pressure varying between 2 and 33 mm. of mercury, but usually lying between 7 and 15 mm. The pressure

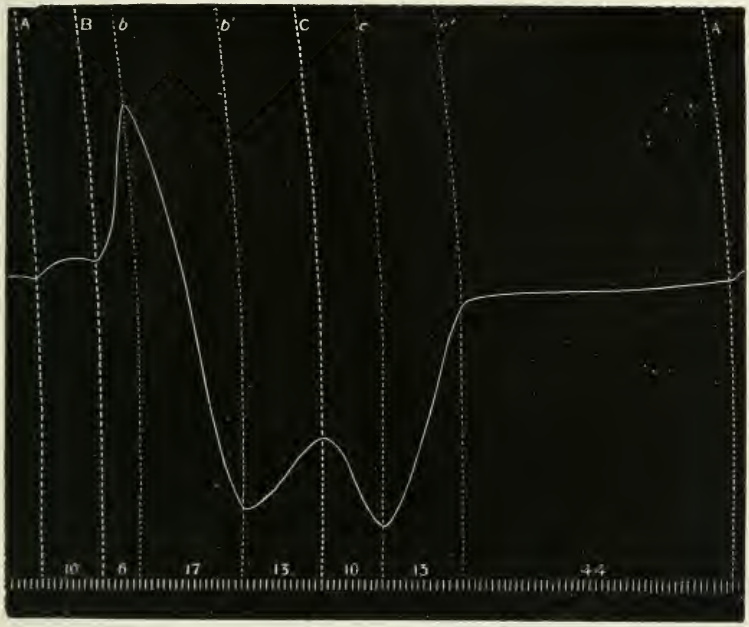


Fig. 1.

only became positive during the systole of the auricle itself, and the maximum which it attained was 2·5 mm. of mercury. Fick,[1] using his spring manometer, came to the conclusion that the pressure within the auricles only became positive during the ventricular systole. This, on the face of it, is absurd, and has been abundantly disproved by the experiments of most competent observers.[2]

When the ventricular systole follows the auricular there is but little if any stasis. Not only do the great veins and auricles relax and dilate under the pulmonary negative pressure, and so accommodate themselves to the blood returning from the periphery, but the action of the ventricles also aids this return of venous blood. Pettigrew[3] developed the theory that during the systole of the ventricles the papillary muscles draw down the curtains of the auriculo-ventricular valves, and thus, by relieving the auricles, make way for the returning blood without any hindrance. Küss

[1] Fick, quoted by Foster, *A Text-Book of Physiology*, pp. 119, 120, 2nd edit., 1878.
[2] Goltz and Gaule, *Archiv für die gesammte Physiologie des Menschen und der Thiere*, xvii. Band, S. 100 u.f., 1878.
[3] Pettigrew, *Transactions of the Royal Society of Edinburgh*, vol. xxiii. pp. 796–7 and 800, 1864.

has conceived such admiration for this theory of Pettigrew's as to lead him to appropriate it as his own; he quotes it without the least acknowledgment,[1] and is commonly regarded, not only on the Continent, but also in Britain, as its author. It is a fact of the greatest significance, showing that just at the instant when they require it most the auricles receive help in performing their functions.

These views receive valuable proof from the investigations of François Franck.[2] His researches on the normal pulsation of the jugular veins entirely confirm the previous deductions of Potain,[3] and thus add the support obtained by experiment to the theories which had formerly been founded upon clinical observation. Much light has been thrown upon the action of the auricles by this recent work.

The accompanying figure, which is given by François Franck and reproduced here by his kind permission, shows tracings taken simultaneously from the jugular vein and the ventricle.

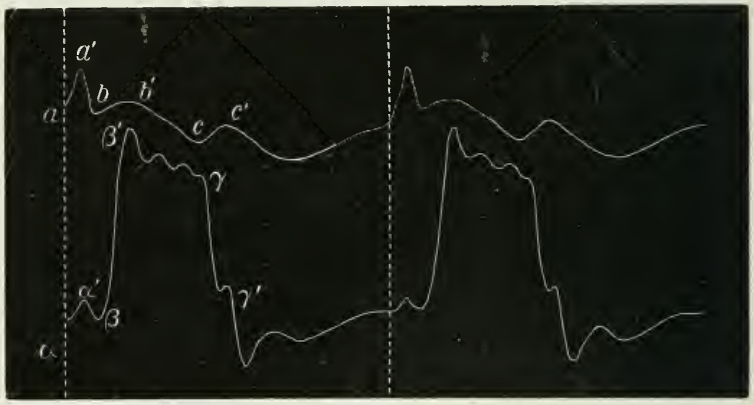


Fig. 2.

The upper or venous tracing shows a sharp elevation beginning at *a*, which is caused by the auricular systole as shown in the cardiac tracing below at *a*. It is succeeded by a depression from the point *a'* which corresponds with the cessation of auricular contraction at *a'*. The sinking of the curve is interrupted by a slight elevation, commencing at *b*, which exactly coincides with the ventricular systole *β*, and which is caused by the shock of the onset of the systole. This insignificant rise is followed by a return of the downward movement from *b'*, which lasts until the

[1] Küss, translated by Amory, *A Course of Lectures on Physiology*, p. 135, 1876.

[2] François Franck, *Comptes rendus hebdomadaires des Séances de la Société de Biologie*, Séances du 2 juillet 1881, du 28 janvier, et du 4 février 1882.

[3] Potain, *Mémoires de la Société médicale des Hôpitaux*, 1868. Communication du 24 mai 1867.

termination of the ventricular systole. During this period the auricles are gradually relaxing before the influx of venous blood, and it is their continued diastole which causes what is practically one movement of depression from a' to c. That this sinking of the jugular veins is caused by the auricular diastole has been incontestably proved by François Franck. He has demonstrated that the tracing presents the same character after artificial closure of the auriculo-ventricular orifice; that when the auricle is reduced to a state of inaction the venous pulse ceases in spite of the continued movements of the ventricle; and that the cessation of ventricular activity has no influence over the depression of the venous tracing, which is manifested so long as the auricle is in action. No doubt, in the unopened thorax the aspiratory influence of the lessened bulk of the heart during the ventricular systole must aid in this depression of the venous curve; but it is thus proved by the facts enumerated above to be mainly caused by the auricular diastole.

At c the descent of the tracing is again interrupted by a little elevation corresponding with the termination of the ventricular systole at γ. This elevation is due, in great part, at least, to the stoppage of the aspiration exerted by the lessening ventricle, and in turn it gives place to another descent beginning at c', a point coinciding with the shock on the sigmoid valves, γ'. It is due to the aspiration caused directly by the relaxation of the ventricle. Whether there be such an active aspiratory force during the diastolic untwisting of the muscular walls, drawing the blood from the auricle and venous trunks into the ventricle, is a point which has been much discussed, but by the researches of Goltz and Gaule[1] it has been positively established. Their investigations, which have been repeated by François Franck, prove that such a force is manifested by the diastole of the ventricle *after the heart has been removed from the thorax.*

The venous curve after this last fall gradually rises as the venous trunks become full.

In health and under normal conditions, therefore, the only hindrance to the return of blood occurs during the contraction of the auricles, when the venous curve shows a sharp ascent.

Comparative anatomy teaches us that those mammals which spend a certain proportion of their lives beneath the surface of the water are endowed with the capacity of great distensibility of the venous channels leading to the right ventricle. Those cavities act as reservoirs until, on the return of respiration, the pent-up blood again obtains admission to the vessels of the lungs. In mammals such as man, which do not in this way suspend the respiratory process, there is nevertheless provision for more or less complete arrest of the pulmonary circulation. When the passage of blood

[1] Goltz and Gaule, *Archiv für die gesammte Physiologie des Menschen und der Thiere*, xvii. Band, S. 110, 111, u. 116, 1878.

through the lungs is hindered either by the operation of natural causes or by disease, and when the pressure in the pulmonary artery tends in consequence to rise, the lungs are relieved by the "safety-valve action" of the tricuspid apparatus, established by the observations of Hunter,[1] Adams,[2] and King.[3] When the heart is tested after death, the pulmonary and tricuspid valves are never, strictly speaking, competent, and I have elsewhere tried[4] to attain an approximate estimation of the pressure required to cause escape from these valves in man and certain domestic animals.

François Franck has shown[5] from the result of experiment that stoppage of the respiration for a brief space of time causes regurgitation into the systemic veins, with a total change in the character of the venous tracing. This may be best shown by inserting here, by his kindness, one of his published tracings. In

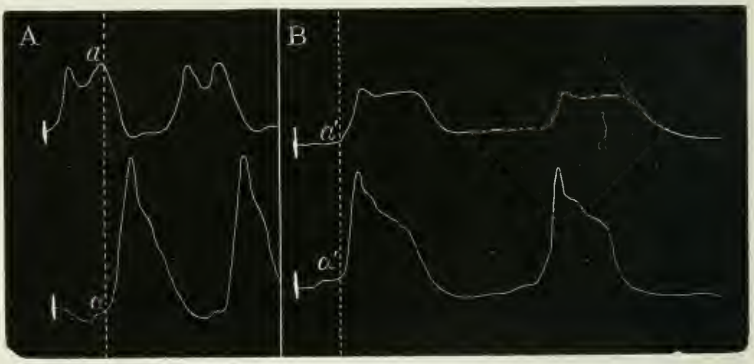


FIG. 3.

Fig. 3 the upper tracing represents the movements of the jugular vein, and the lower gives the pulsations of the right ventricle, registered simultaneously with those of the vein. The part marked A was taken while the artificial respiration was maintained with regularity, and the other portion, B, after the respiration had been suspended for two and a half minutes. In the first part—*i.e.*, during the regular continuance of artificial respiration—it will be seen that the tracing given by the vein is characterized by an abrupt descent at *a*, a point which coincides exactly with the commencement of the ventricular systole in the curve below at *a*. This descent is, as above described, to be ascribed to the diastole of the auricle. In the second portion of the tracing, B, on the other hand, the ventricular systole *a'* causes a considerable elevation of the venous curve at *a'*, in consequence of regurgitation from

[1] Hunter, *A Treatise on the Blood, etc.*, Part I. chap. ii. p. 162, 1794.
[2] Adams, *Dublin Hospital Reports*, vol. iv. p. 437 *et seq.*, 1827.
[3] King, *Guy's Hospital Reports*, vol. ii. p. 125 *et seq.*, 1837.
[4] Gibson, *Edinburgh Medical Journal*, vol. xxv. p. 979, 1880.
[5] François Franck, *op. cit.*, Séance du 17 juillet 1881.

the ventricle into the auricle and venous trunks. Thus again the result of experiment entirely confirms the theories drawn from clinical facts.

When the obstacle to the passage of the blood through the pulmonary vessels is persistent, the regurgitation becomes permanently established, and the abnormal venous pulse—*i.e.*, that of the latter part of the tracing—is fairly set up. It constitutes a symptom of great value as indicating the condition of the right side of the heart.

François Franck has lately discussed[1] the mechanism of tricuspid incompetence, and has shown that permanent regurgitation is dependent upon dilatation of the fibrous ring around the auriculo-ventricular orifice, while the temporary form of incompetence is due to abnormal distention of the ventricle, the walls of which, in consequence, drag the *chordæ tendineæ* downwards and prevent closure of the valvular curtains.

Before entering upon a brief consideration of the venous pulse as a symptom of the state of the heart, it may be remarked in passing that the right auricle sometimes gives direct evidence of its condition. Thus Stokes[2] narrates a case in which a pulsating tumour existed to the right of the sternum; this, after death, was found to be the right auricle, which "presented a most singular appearance when the chest was opened, resembling a vast purple tumour which concealed the whole of the anterior portion of the right lung."

The so-called "venous pulse" or "arteriosity of veins,"[3] more especially in the neck, gives the most important indication as to the condition of the right auricle. Morgagni[4] pointed out that the venous reflux consisted of two waves, the former of which he attributed to the auricular and the latter to the ventricular systole. In this state knowledge remained until the introduction of the graphic method.

Bamberger[5] published the earliest sphygmographic tracings of the jugular movements; these tracings showed a saddle-shaped curve. He thought that the first shoulder was caused by the systole of the ventricle, while the second was due to the contraction of the *musculi papillares*, and in this interpretation he must be regarded as taking a retrograde step.

Geigel[6] immediately afterwards described a presystolic, a primary, and a secondary systolic elevation of the curve. The first-named of these he considered as arising from a stowage-wave, and

[1] François Franck, *op. cit.*, Séances du 17 juillet 1881 et du 11 février 1882.

[2] Stokes, *op. cit.*, p. 274.

[3] Testa, *Delle Malattie del Cuore, loro Cagione, Specie, Segni e Cura*, tomo iii. capo xvii. § 3, 1810–11.

[4] Morgagni, *De Sedibus et Causis Morborum*, Lib. II. Epist. Anat. xviii. art. 10, 1761.

[5] Bamberger, *Würzburger medicinische Zeitschrift*, iv. Band. S. 232, 1863.

[6] Geigel, *Würzburger medicinische Zeitschrift*, iv. Band, S. 332, 1863.

the second and third respectively as of auricular and ventricular origin. In the same year Marey,[1] in his classic work, figured and described a venous tracing with two waves—auricular and ventricular. In a subsequent communication Geigel[2] stated that his further observations lent no support to his former conclusions, and that the first wave appeared to be caused by the contraction of the right auricle, while the second and third were ventricular.

The most careful and philosophical descriptions of the form of the waves in jugular reflux are given by Friedreich.[3] The accompanying tracings are taken from his paper. The one shows three waves, *a*, *b*, and *c*; the other only two, *b* and *c*. Bestowing our attention mainly upon the first wave, *a*, which is caused by the systole of the right auricle, we find in it an index of the state of the auricular muscle. So long as it is shown in tracings from the jugular, the auricle is comparatively healthy; when it disappears it is a certain proof of paralysis of the auricle, and if it should reappear it gives evidence of a return of contractile power. In this way the auricular wave in the jugular veins is of very considerable practical interest. The large wave, *b*, is caused by

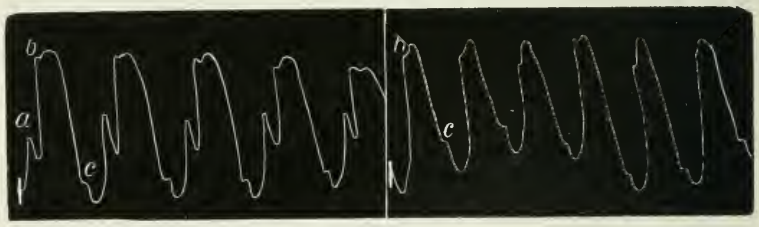


Fig. 4.

the systole of the ventricle, and the third wave, *c*, is reflected from the interior of the heart, in the same way as the dicrotic wave in the radial tracings of aortic regurgitation first shown by Naumann.[4]

The left auricle cannot in the same way give evidence of its condition; and, moreover, being deeply buried behind the ventricles and great vessels, changes of size are almost beyond the possibility of detection. But fortunately the left auricular appendix, lying against the outer side of the pulmonary artery in the second left intercostal space, affords the means not infrequently of determining the state of the auricle with great nicety. It is to this part of the subject that attention is particularly requested, and the earlier part of the paper may be regarded as leading up to it.

[1] Marey, *Physiologie médicale de la circulation du Sang*, p. 532, 1863.
[2] Geigel, *op. cit.*, vi. Band, S. 249, 1865.
[3] Friedreich, *Deutsches Archiv für Klinische Medicin*, i. Band, S. 241, 1866.
[4] Naumann, *Zeitschrift für rationelle Medizin*, xviii. Band, 215 S., 1863.

In cases of disease of the mitral orifice, a systolic murmur may sometimes be heard at the base of the heart, and in this situation it is often distinctly louder than in the mitral area. Naunyn[1] has shown that this basic murmur of mitral disease has its point of maximum intensity quite outside of the pulmonary area, and about an inch and a half from the left edge of the sternum, in the second left intercostal space. This fact is sufficient to disprove Skoda's[2] theory, which need not be mentioned here; and Naunyn has explained the causation of the murmur by ascribing it to the regurgitation at the mitral orifice, the sound vibrations being carried along with the current of blood into the left auricle.

In spanæmia and allied conditions, including febrile diseases, there is also a systolic murmur, most clearly audible over the base of the heart. This murmur has been in turn attributed to the aortic, to the pulmonary, and even to the tricuspid orifice. But in more recent times Balfour[3] has extended Naunyn's explanation of the basic murmur of mitral disease to the similar murmur of spanæmia, which is, with the exception of the accentuated second sound in the pulmonary area, the earliest sign of cardiac affection in this malady, and which is speedily followed by the development of a systolic murmur at the apex.

I do not in this paper feel called upon to follow the reasoning lucidly given in the writings above referred to in support of Balfour's view, but I may be allowed to make one or two remarks on the subject. The causation of the murmur in mitral disease is quite clear; there is an admittedly patent orifice through which a stream of blood is driven into the left auricle with the whole force of the left ventricle. It must be observed that such cases of mitral disease as are accompanied by a murmur in the position above indicated—a position which might be termed the "auricular area"—are almost invariably pale and spanæmic, with flabby muscles; they therefore agree, in so far as the condition of the muscular system is concerned, with cases of spanæmia and fever.

From the nature of spanæmia and allied diseases, the opportunity of confirming the diagnosis after death is fortunately of extreme rarity. In patients who have died of febrile disorders, however, post-mortem examination shows that the heart shares in the general state of the muscles, and the left auricle is found to be considerably dilated, as well as the other chambers of the heart. In mitral disease it is not uncommon to meet with a very much dilated left auricle after death.

The only other part of the circulatory apparatus, besides the left auricle, which could be supposed capable of causing the basic murmur is the pulmonary artery. But we have sufficient proof

[1] Naunyn, *Berliner klinische Wochenschrift*, 1868, S. 189.

[2] Skoda, *A Treatise on Auscultation and Percussion*, translated by W. O. Markham, M.D., p. 246, 1853.

[3] Balfour, *Clinical Lectures on Diseases of the Heart and Aorta*, p. 161, 1876, p. 172; and *Lancet*, vol. ii. for 1877, p. 383.

absolutely to disprove such a view. It is well known that in many cases the basic murmur in the "auricular area" is accompanied by a distinct pulsation, which has its point of maximum amplitude about an inch and a half from the left edge of the sternum. Apart from the inherent improbability that the pulmonary artery should be displaced so far during the development of spanæmia, and afterwards return to its original position, we have in the graphic method a means of reaching a solution of the question. It has been my privilege to contribute some cardiographic observations[1] to the subject, and before concluding this paper I wish briefly to allude to them. In order to do so, two of the tracings are reproduced here. The single tracing gives the

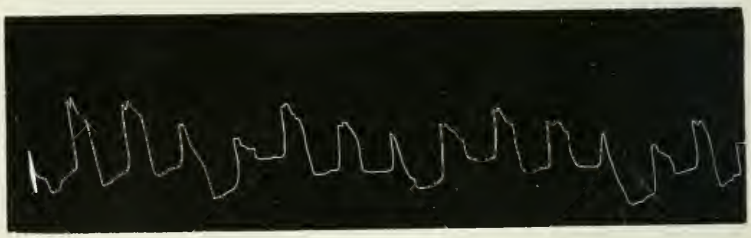


Fig. 5.

character of the pulsation. It is evident at a glance that it is not arterial, and therefore it is not such a tracing as could be obtained from the pulmonary artery. Nor, further, is it such a tracing as the *conus arteriosus* gives. The first tracing figured in this paper (page 89), which gives the form of curve obtained from the *conus arteriosus* in a case of cleft sternum, is totally different from the one immediately preceding in its character. Therefore the pulsation in the second left intercostal space can hardly be caused by any part save the auricle. And that the pulsation is not due to the contraction of the auricle itself is proved by the following

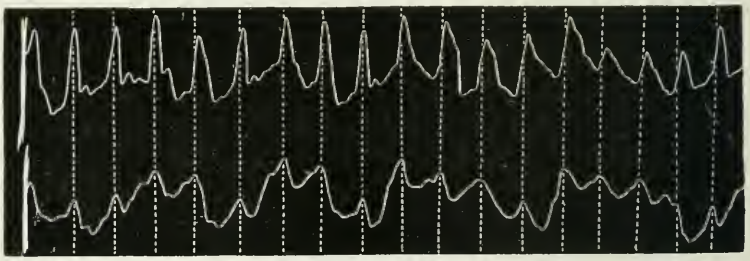


Fig. 6.

figure (taken from the same case as that just preceding), which

[1] Gibson, *The Lancet*, vol. ii. for 1877, p. 418; *Edinburgh Medical Journal*, vol. xxiii. p. 299 and p. 1012, 1877-78.

gives the tracing from the apex beat simultaneously with of that the pulsation in the second left intercostal space, which is above it in the figure. In it the wave of pulsation in the upper tracing is seen to *follow*, not to *precede*, the systolic wave of the lower or apex tracing. These facts seem to prove decisively that the auricle is the part of the heart which causes the pulsation, and that it does so in consequence of systolic regurgitation into it from the ventricle.

It is sometimes of use to pass in review a series of facts which have been discovered, and so to attain a conception how our knowledge stands. Such has been the aim of this paper. There is still much misapprehension regarding the auricles of the heart and their action, more especially with reference to the facts dealt with in the latter part of the paper. If it should lead any one to bring forward new facts either to prove or to disprove any of the theories supported in it, the object of the paper will have been fully gained.

On the motion of Dr Wyllie, the discussion on it was postponed till after the reading of the next paper.

X. The following paper by *Dr W. Russell* of Carlisle, which was down for communication by Dr Brakenridge, was read in his absence, and at the request of the Society, by its author:—

THE MURMURS OF DEBILITY IN THE PULMONARY AND TRICUSPID AREAS.

Of the various theories advanced in explanation of the systolic murmur frequently present in the pulmonary area as a concomitant of debility, none has, perhaps, aroused more interest than the application by Dr G. W. Balfour of Edinburgh, to the solution of the difficulty, of Naunyn's theory that in organic mitral incompetence the systolic murmur heard in this region is a mitral regurgitant one, carried by the regurgitant stream into the dilated appendix of the left auricle, and audible here from the proximity of the appendix to the thoracic wall. In support of this view, it is maintained that the murmur attains its maximum intensity some distance to the left of the sternal edge, and that this point coincides with the position of the appendix; and, further, that the dilatation is occasionally, if not frequently, evidenced by an auricular pulse.

This murmur, sometimes alone, but frequently associated with a systolic bruit in other cardiac areas, is heard in a large proportion of all cases of debility, whether due to chlorosis, to the various fevers, or to parturition. It will not be seriously denied here that in these affections there is relative insufficiency of the mitral valve, the result of a debilitated and relaxed condition of the

cardiac muscle, including the musculi papillares. This insufficiency, however, is not always evidenced by a bruit at the apex, the point at which mitral bruits are ordinarily audible; but regurgitation is assumed from the accentuation of the pulmonary second sound, and from the presence of a systolic murmur in the pulmonary area. So far the facts may be accepted as indisputable, and the inference of mitral regurgitation granted, I think, without hesitation; but, with the utmost respect for the opinions of the distinguished advocates of the auricular theory, I venture to question the explanation offered by them as to the place of production of the murmur.

It is necessary to the acceptance of the auricular theory that the murmur in question be present in organic incompetence of the mitral valve, whether associated with stenosis or not. Rosenstein,[1] Guttman,[2] and Balfour[3] hold that it is present in such conditions. Rosenstein confines the murmur to the second space; while Balfour speaks of the "auricular area" as "above the fourth rib, to the left of the sternum,"[4] and ascribes the pulsation in this region, both in mitral regurgitation and mitral stenosis, to the auricle. The centre of interest in investigating this subject lies in the appendix of the auricle; for the idea of the murmur being conveyed direct from the body of the auricle, notwithstanding its depth in the chest, and that the pulmonary artery interposes between it and the parietes, is not likely to be received with credence. In the first place, there are, I believe, anatomical and other considerations which weigh against the appendix of the auricle being the site of the pulsation and murmur in question. The origin or root of the appendix is overlapped in part by the pulmonary artery, so to reach the parietes the appendix has to traverse a course equal to the diameter of that vessel. Any increase in the diameter of the artery, from increase of its contents, will thus place the appendix deeper in the chest; and the distance it has to travel towards its assumed destination is further increased by dilatation of the auricle carrying its root upwards. During dilatation of the appendix its movement is mainly a downward one, following the base of the ventricle as it contracts during systole. Doubtless there must also be, as Sibson[5] points out, a certain amount of forward movement, but this can only be inconsiderable; and when Rosenstein[6] speaks of the left auricular appendix lying on the anterior wall of the pulmonary ostium, he

[1] Ziemssen's *Cyclopædia of the Practice of Medicine*, vol. vi. p. 121 *et seq.*
[2] *A Handbook of Physical Diagnosis*, p. 289, New Sydenham Society's translation.
[3] *Diseases of the Heart*, p. 152, 1st edition.
[4] *Op. cit.*, p. 152.
[5] Reynolds's *System of Medicine*, vol. iv. p. 67.
[6] Ziemssen's *Cyclopædia of the Practice of Medicine*, vol. vi. p. 58.

surely wanders, for the moment at least, into the realms of fancy. It is further recognised that, in debility, owing to dilatation of the right ventricle, the left is displaced outwards and backwards; or a change occurs which may be regarded as a rotatory movement of the heart round its longitudinal axis; and this must be conceded as having a displacing effect on the auricle analogous to what it has on the ventricle of the same side. While holding that the normal position of the appendix is considerably distant from the thoracic wall, I deduce from the reasons stated above that the distance is increased in conditions of debility. That being the case, pathological anatomy has yet to show us to what extent the appendix shares, even in cases of organic disease, in the dilatation of its companion auricle, and in which of its diameters the dilatation occurs. My own observations lead me to believe that when it is enlarged the enlargement is more transversely than longitudinally, and I have never seen it so enlarged as to warrant the belief that it is the cause of the extensive pulsation claimed for it by Dr Balfour in the second and third spaces. In this connexion I may remind you that it is a frequently noted fact in mitral stenosis, where the conditions are peculiarly adapted to produce dilatation, not only that no such effect is necessarily obtained, but, in addition, that the appendix is frequently the seat of a thrombosis filling its cavity, showing conclusively that its physical conditions are such as allow its contained blood to form what can be little else than a sluggish eddy. And I venture to ask if it be not a pure assumption that, under such circumstances, and considering that the appendix only forms a side-chamber to the auricle, sound should be so readily and so invariably propagated into it as is assumed.

I shall now state what I believe to be the sequence of cardiac phenomena in cases of debility, and what I venture to suggest as their explanation.

The first indication given of valvular failure at the left *ostium venosum* is accentuation of the pulmonary second sound; this accentuation increases, and is soon preceded by a systolic murmur in the second left space. The murmur, while distinctly blowing in character, contains, at the same time, a rougher or harsher element, and is frequently not the purely soft, blowing sound heard at the apex in occasional cases. A further peculiarity of the murmur is, that during inspiration it gradually disappears—first losing its harsher element, then, towards the completion of inspiration, wholly vanishing. This is one stage, and no further change may occur save towards recovery. If recovery should not begin here, the murmur increases in intensity, and a systolic bruit, varying considerably in tone in different cases, appears in the third and fourth left spaces, between the costal cartilages, and, simultaneously with this, a marked undulation, or even regurgitation, in

the veins of the neck. Should the constitutional condition continue or become aggravated, pulsation becomes very marked, if it be not already so, in the second, third, and fourth spaces, the pulsation extending further out the lower the interspace, but not reaching the nipple line unless the apex pulsation be present, when the two coalesce. This is an outline picture of what occurs, and it can sometimes be followed step by step in such a gradually debilitating affection as hæmaturia following slight attacks of scarlet fever, and some of the more prominent stages of which were well shown in the following case:—

Case I.—A lad aged 17, who died of hæmorrhagic purpura. There was pulsation in the second, third, and fourth interspaces. Over the site of pulsation in the fourth space the first sound was metallic, with a slight impurity; at the apex the first sound was faint and impure, the impurity being heard towards the axilla. There was a well-marked systolic bruit in the second left space, lost half an inch from the sternum, not audible on the adjoining part of the sternum or in the third space, and only heard during expiration, completely disappearing with full inspiration. The pulmonary second sound was much accentuated; the veins in the neck were not distended. These notes were taken on the 7th or 8th of the month of admission. On the 12th, when the patient had become decidedly worse, there was no bruit or impurity audible over the apex or towards the axilla. There was a systolic bruit in the second, third, and fourth interspaces, which was markedly loudest in the second space, where it was rasping in character. The jugulars were prominently pulsating. Notwithstanding the utmost pressure, we were forbidden to make a post-mortem examination of this case.

I shall hereafter refer to the murmur in the second space as pulmonary, and in the third and fourth spaces as tricuspid.

In some cases, I believe, both bruits appear almost simultaneously. In chlorosis one or both may be present, according to the stage at which the case comes under observation, and according to the state of cardiac debility. If the two murmurs be contemporaneously present the tricuspid may be the louder, and in some interesting observations on this point made by Dr Money[1] on parturient women, and communicated to the Royal Medical and Chirurgical Society, he found that out of 42 cases with murmur over the right heart 36 were loudest in the tricuspid area, this area being considered the fourth left space a little to the left of the sternum. In the more fully developed stages the murmur in the second space does not wholly disappear with forced inspiration; but this, in cases of extreme debility, may either be due to diminution in the muscular power necessary to the act, or be

[1] *British Medical Journal*, 1882, vol. i. p. 306.

accepted as evidence that the murmur has no longer its seat in the pulmonary artery.

The following case, of which I have not preserved as extensive clinical notes as of Case I., proves, I think, positively that neither the auricle nor its appendix was the seat of the murmur and pulsation in the second left space, and this under conditions which must be acknowledged as typical:—

Case II.—A man aged 30, who was the victim of pernicious anæmia. The apex of the heart beat in the fifth interspace, half an inch outside the nipple line. Over the apex there was a faint, blowing murmur, the intensity of which increased towards the sternum, and attained its maximum in the second and third spaces, half an inch from the sternal edge, and here the murmur was grating, although not loudly so, in character; the murmur faded during deep inspiration. In the second space dulness extended outwards over an inch. I am indebted to the courtesy of Dr Mortimer, the present house physician to the Wolverhampton Hospital, for a copy of the post-mortem notes recorded by me in the Hospital register with reference to this case. The origin of the pulmonary artery was under the second rib. In the second left space the right ventricle extended for fully two inches to the left of the sternal edge. The left auricular appendix was not visible, and was found to lie deeply, the heart having to be turned upwards to bring it into view. There was a "milk-spot" on the right ventricle opposite the third rib and fourth space.

Case III.—A boy aged 7 years and 9 months, who died of purpura hæmorrhagica. While this case does not afford the same positive evidence as the preceding, it is yet of sufficient interest to be recorded here. On admission the pulmonary second sound was accentuated, but there was no bruit audible over the cardiac region. Ten days after admission, when the patient had become much worse, there was a systolic murmur in the second, third, and fourth left spaces, loudest in the second, about half an inch from the edge of the sternum; while over the sternum adjoining the fourth space it was somewhat coarsely rubbing in character. At the autopsy it was found that the origin of the pulmonary artery was under the second rib, while the adjoining part of the right ventricle extended slightly outwards in the second space. The appendix of the auricle was not unduly prominent and did not appear enlarged.

The murmur in the second left space is, I believe, produced in the pulmonary artery, save in the more advanced cases to which I shall refer hereafter. Its mode of production may be explained by a consideration of the relative tensions in the artery and in the left auricle, and in their anatomical relations to each other. Owing to the tension in the pulmonary vessels, the fulness of

the auricle must at all times be increased; in fact, the blood coming from the lungs pours into it as rapidly as it empties itself into the ventricle, the result being that its cavity, although enlarged by sharing in the debilitating influences in existence, is already full before the ventricular systole not only prevents further relief to the tension in the pulmonary circuit, but throws back upon it (the auricle) the blood embraced by the segments of the mitral valve as they swing to close the auriculo-ventricular orifice, as well as the column of regurgitant blood from the ventricle. During the filling of the auricle it, according to Sibson,[1] enlarges upwards, forwards, and downwards. The pulmonary artery, subjected to the same tension as the system of which it forms part, has its diameter enlarged, and approaches the chest wall anteriorly and the auricle posteriorly. Now, what I assume to be the result in these circumstances is, that the dilated auricle presses upon the posterior aspect of the pulmonary artery, producing thereby a relative constriction of its lumen sufficient to create the fluid veins necessary for the production of a murmur. The anatomical relations of the parts warrant this explanation; and, if my view of what takes place be correct, it will not be doubted that it is sufficient to cause the murmur. According to this theory the distended auricle aids in pushing the pulmonary artery towards the chest wall; and in the degree to which this is done may, I think, be found the explanation both of the amount of pulsation produced by the artery in the interspace, and of the variety in tone assumed by the murmur, from the loud rasping (Quincke's explanation of which is accepted by Balfour) to the slight forms where it is a mere scratching. The harsh element in the murmur is attributed by Sibson and others to the seat of the murmur being superficial. It may, however, be accounted for in two other ways, namely, that it is a rubbing sound caused by the impingement during systole against the parietes of the point of junction of the artery and conus arteriosus; or that it is the result of the obstructive origin of the murmur, coupled with the condition of the blood. The former explanation is, I think, the more satisfactory, and is strengthened by the fact that the tricuspid murmur frequently presents the same peculiarity. While in the more aggravated cases, occasionally seen, the harshness of the murmur can be accounted for by an increase in the degree of constriction, from a greater dilatation of the auricle more markedly interfering with the lumen of the artery. And this would also explain the stenotic character at times displayed by the murmur.

The clinical evidence adducible in support of the explanation I offer, both of the mode of production of the murmur and likewise of its tone, is that during inspiration the rubbing element in the murmur is the first to disappear, while with deep inspiration the

[1] Reynolds's *System of Medicine*, vol. iv. p. 95.

murmur, save in the more aggravated cases, vanishes altogether. The murmur is frequently so loud that the interposition of a more or less thin edge of inflated lung would not so completely obstruct its conduction as must be assumed it does if the auricular theory be accepted; whereas, with the explanation I suggest, its disappearance is accounted for by the elevation of the thorax during inspiration giving the resilient artery more room, whereby it is enabled to free itself from the pressure of the auricle behind it, and thus to regain its legitimate lumen.

I shall now briefly consider the murmur in the third and fourth spaces. The pulsation in these two spaces is over the part of the right ventricle, which on dilatation is the first to manifest its dilatation by pulsation. In addition I have frequently observed the murmur in the spaces mentioned develop after the pulmonary one had been some time in existence, and concomitantly with the appearance of undulation or pulsation in the jugulars and a lessening of intensity in the pulmonary second sound. I therefore see no reason why it should not be accepted as a tricuspid regurgitant one. The only other feasible explanation is, that it is the pulmonary murmur conducted downwards; but the evidence against that is, that on the appearance of the tricuspid murmur the pulmonary one frequently lessens in intensity, the intensity being necessarily affected by the diminished force with which the blood is propelled into the vessel. And I have already referred to recent observations showing that the tricuspid murmur is the louder in the great majority of cases of a certain class.

While I thus believe the murmur in the second left space to be produced, in the earlier stages of debility, in the pulmonary artery, and that in the third and fourth spaces to have its origin at the tricuspid orifice, Case II. showed that the murmur in the second space was heard, not in the pulmonary artery, but over the upper part of the conus arteriosus, and that therefore the murmur in this space is, in cases of great dilatation, really the tricuspid one, heard here in addition to the third and fourth spaces. That the pulsation in the second space, in cases of organic mitral disease, is due to the dilated right ventricle, I have frequently satisfied myself by post-mortem examination.

In aggravated cases of debility, and in cases with organic disease of the mitral orifice leading to dilatation of the right ventricle, it will, I think, be found that the pulmonary artery is relieved from the pressure to which it would otherwise be subjected, and which might seriously interfere with the passage of the blood to the lungs, by what is practically a rotatory movement of the heart to the left, whereby the left auricle is placed deeper in the chest and to the right of its normal position, while the origin of the pulmonary artery is carried upwards and to the left. By this movement the artery obtains a less rigid barrier along its anterior aspect, and secures an unobstructed course by being removed from

the line of direct pressure between the auricle and the thoracic wall.

The foregoing may be briefly summarized as follows:—*Firstly*, Case II. proves that the pulsation and bruit in the second left space, and that in a case of debility, were not due to the left auricle or its appendix: that, on the contrary, the pulsation was due to the conus arteriosus, and the bruit presumably tricuspid in origin. This is the usual condition in advanced debility and in organic disease of the mitral orifice. *Secondly*, That in less advanced cases the murmur is produced in the pulmonary artery by the pressure of a distended auricle. *Thirdly*, That the murmur in the third and fourth spaces, and not infrequently in the second, is a tricuspid regurgitant one. *Fourthly*, As the cardiac changes progress the pulmonary bruit disappears, owing to the altered relations between the various parts of the heart and the thoracic wall, and has its place occupied by the tricuspid bruit.

The Chairman said the Society were much indebted to both Drs Gibson and Russell for their respective papers. He regretted very much that Dr Balfour was not present himself to give his opinion on a subject in which he took so much interest, and regarding which he was better able than any other to speak.

Dr Wyllie fully shared the regret at Dr Balfour's absence. No one could have given a more authoritative opinion on the questions before them that evening. The first paper brought very clearly before them the causation of the venous pulse in the neck. It also showed the effect of the contraction of the musculi papillares, which Dr Russell did not seem to fully appreciate. The two cusps of the mitral valve were pulled closely against the muscular substance during the ventricular systole, so that there could not be propulsion of the blood and distention of the auricle, which Dr Russell seemed to think existed. The points advanced in both papers were put precisely, and were of great interest. As regards the chief point of difference between them, he was afraid that for some little time they must remain in dubiety as to the cause of the basic bruit found in debility. It was not, as they thought formerly, aortic in character. He quite believed that they must refer the bruit either to the auricle or to the pulmonary artery. Which of them, however, is the seat of the bruit? He thought that notwithstanding Dr Russell's precise statements they could not accept what he said without fuller details of his post-mortem examinations. The moment the cavities of the heart were cut into they contracted to some extent, and thus an auricle somewhat distended before incision might be afterwards smaller in size. Nevertheless, apart from the facts, the theory advanced by Dr Russell was one possessed of a good deal of intrinsic probability. The conus arteriosus, he thought, might become enlarged and elongated upwards and to the left. It was also possible that the systolic

bruit audible in the same situation might be due to pressure against the conus arteriosus by the auricle. This theory and the auricular theory supported by Dr Balfour and Dr Gibson seemed pretty well balanced against each other. If Dr Russell were correct in regarding this bruit as pulmonary, he (Dr Wyllie) would be inclined to consider it as endocardial, not as frictional or exocardial, as Dr Russell would seem to imply. It was always blowing. It might be more or less rough, but he considered it probable that its occasional harsh character might be due, not to an element of friction, but to the superficial position of the artery. The bruit became softer and less audible during inspiration when the lungs covered the pulmonary artery. To his mind, however, the whole question was still unsettled.

Dr Gibson had little to say in reply. Of the patients whom he had observed and described in previous communications with auricular pulsation, only one, so far as he knew, had died, and he was unable to see the post-mortem appearances in that case. He had seen many autopsies of cardiac subjects, but had never seen anything like the appearances described by Dr Russell, and he was inclined to look upon his cases as entirely different from his own. In his own cases the murmur was clearly mitral, and extended round to the axilla and scapula of the left side.

Dr Russell said the murmurs in the cases he had read in illustration of his views had not been heard either at the apex or the angle of the left scapula, and were therefore not mitral. In reply to Dr Wyllie, he said his observations had not been made by cutting into the various chambers of the heart, but by noting the parts of the heart visible in each interspace, and he had done that by performing the post-mortem examinations with great care, so as not to disturb the thoracic organs. The sternum had been removed in the ordinary manner, and the heart exposed by opening the pericardium, after which the sternum had been replaced and the parts looked at *in situ*.

Meeting VII.—May 3, 1882.

Dr George W. Balfour, *President, in the Chair.*

I. *Dr Allan Jamieson* showed a CHILD suffering from a comparatively rare form of skin disease, viz., *lichen circumscriptus*. It was to be seen both on the trunk and limbs, a thing which in itself was very rare, as it hardly ever affected the limbs. The child, which had been very healthy, began to suffer from it in February last. It commenced as little spots or macules, which rapidly extended. The patient was seen first on the 13th March, and the disease was not then so extensive as now. It itched very

considerably. It had been treated with arsenic internally and a soothing lotion externally, as Liveing recommended, but without much effect, each dose, according to the mother, seeming to make it worse. Besides the spots of lichen circumscriptus, there could be seen others presenting an appearance like *lichen marginatus*—pinkish or reddish papules enclosing a fawn-coloured area. This had been recently described by Duhring and Guibert as *pityriasis maculata* or *circinata*. They had coined this new name, evidently unaware that the affection had been previously described. Another point of interest was that this seemed to link the lichen circumscriptus with the affection of *tinea tonsurans maculata* described by Hebra. Dr Jamieson had carefully examined the scales obtained from specimens of this latter disease, and no parasitic elements could be found in them. There was no doubt that they were forms of lichen. What the relation of the disease was to lichen scrofulosorum, which had no subjective symptoms, he could not say. Along with the case Dr Jamieson showed three drawings —one done by Mr Cleland from the case itself; another of lichen scrofulosorum; and a third, one of Wilson's plates, showing what he called *lichen annulatus scrpiginosus*, but evidently *lichen circumscriptus*.

II. *Dr Kirk Duncanson* showed a HAY-SEED (in a bottle, which contained so many aural polypi and foreign bodies that the seed itself could not well be seen nor got out) which he had removed from the tympanic cavity of a cabman some days previously. It had got into his pharynx when he was eating some of the feeding stuff of his horse, and, passing into and along the Eustachian tube, found its way into the tympanum. He had suffered from pain in his throat on swallowing, and now came complaining of great pain deep in the ear. The membrana tympani, in its lower anterior segment, was protruding into the external auditory meatus. Dr Duncanson made an incision into the protrusion, and, laying hold of a foreign body with forceps, extracted the hay-seed by its proximal end.

III. *Dr M'Bride* read his paper on

THE CAUSES OF TINNITUS AURIUM.

THE symptom to which I propose to call your attention is very common and sometimes extremely distressing. While one person is slightly, if at all, inconvenienced by its presence, another has his existence made so miserable that he is tempted to end a life which has become unbearable.

There is a form of hallucination which is by many authors classed as tinnitus. I allude to the hearing of various melodies, animal and even human voices, which have no objective existence.

Brunner[1] and Hartmann,[2] however, regard these phenomena as psychic in their nature, and due to irritation of the higher cerebral centres. That such is the case is evident; but whether this irritation may not be produced by stimulation of the peripheral extremity of a sensory nerve—more especially the auditory—we must, I think, leave an open question, although the first-named author expresses himself very decidedly against this view.

While not committing ourselves to any definite hypothesis concerning the production of this rare form of tinnitus, let us turn to a consideration of less obscure varieties.

The sounds described by sufferers vary greatly in character. To use the language of Sir Wm. Wilde,[3] "Persons from the country or rural districts draw their similitudes from the objects and noises by which they have been surrounded, as the falling and rushing of water, the singing of birds, the buzzing of bees, and the waving or rustling of trees; while, on the other hand, persons living in town, or in the vicinity of machinery or manufactures, say that they hear the rolling of carriages, hammering, and the various noises caused by steam-engines. Servants almost invariably add to their other complaints that they suffer from the ringing of bells in their ears; while, in this country, old women, much given to tea-drinking, sum up the category of their ailments by saying that all the kettles in Ireland are boiling in their ears. The tidal sound, or that which we can produce by holding a conch-shell to the ear, is, however, what is most frequently complained of."

Perhaps the division, proposed by Dr Woakes,[4] into tidal, rushing, pulsating, and bubbling, is as accurate and comprehensive a classification as the subject admits. Brunner[5] has noticed a clear ringing note as the result of violent stimulation of the auditory nerve either by loud sound or electricity. In one patient he could produce this subjective phenomenon by touching a granulation which grew from the promontory in which is contained the first turn of the cochlea. He therefore suggests that the auditory nerve may react as a whole, producing the sensation of a high metallic sound, just as, in the case of the optic nerve, electric stimulation, pressure, and section are known to produce sensations of light.

In cases of ear-disease, also, where the stapes is exposed to view, touching it with a probe is followed by violent ringing in the ear.

The opinion is still held by many that the most common cause of tinnitus aurium is to be sought in hyperæsthesia of the auditory nerve. Now, while quite readily admitting that this may be a predisposing element, it is difficult to believe that it is ever an exciting cause. Hyperæsthesia of the nerves of hearing no doubt occurs, but probably seldom without the whole nervous system being similarly affected. Where it does exist, it is possible that

[1] *Archiv of Otology*, ix. p. 75.
[2] *Die Krankheiten des Ohres*, p. 47.
[3] *Aural Surgery*, p. 83.
[4] *Deafness, Giddiness, and Noises in the Head*, chap. vii.
[5] *Archiv of Otology*, p. 57.

the arterial and venous currents either in the labyrinthine or adjacent vessels may be perceived by the over-sensitive nerve. Hyperæsthesia means that stimuli are readily conducted by the nerves, and widely diffused in the ganglia; but it does not imply that the nerves can convey impressions which have no existence.

It seems perfectly obvious that tinnitus must arise from a stimulus, either applied to the auditory nerve or conducted by other channels to its centre. Stimulation of the former may be, and under ordinary circumstances always is, due to vibration of the fluid contents of the labyrinth. Occasionally pathological conditions exist, which cause direct pressure on the nerve-trunk, the result of such pressure being, probably, first stimulation, and then paralysis. The auditory centre may also be reached through nerves of common sensation, as in those cases where subjective auditory phenomena are due to the presence of carious teeth.

Having, then, arrived at the conclusion that in every case some other factor besides hyperæsthesia of the auditory nerve must be sought, we shall consider possible causes more in detail. Abnormal conditions of the organ of hearing are probably the commonest causes of tinnitus. Any foreign body in the meatus is liable to produce the symptom in question. The mass may be large or small, it may be composed of wax, epithelium, fungus, or the products of an eczema. In these cases, I believe the actual cause of tinnitus is to be sought in one or more of the following factors, viz.:—1. Slight vibrations communicated to the drum membrane by contact with the substance; 2. Pressure on the drum membrane communicated to the stapes, and producing a change of tension in the labyrinthine fluid; 3. Pressure on the walls of the meatus, causing vascular changes, and possibly murmurs audible to the ear in which they occur.

I am aware that this statement is opposed to the views of Dr Woakes, who considers that the tinnitus in those cases is produced by reflex spasm of the tensor tympani excited by the foreign matter. I fail, however, to see the necessity for such an hypothesis.

It is in middle-ear disease, with imperforate drum membrane, that we most frequently meet with tinnitus aurium. In such cases the symptom is usually ascribed to one or more of the following causes:—1. Abnormal conditions of the intrinsic muscles of the tympanum; 2. Vascular changes; 3. Increased intra-labyrinthine tension; 4. The presence of free fluid in the tympanum. Each of these we must now consider separately. There can be no doubt that in certain cases spasmodic contraction of the intrinsic muscle may be perceived as a sound by the ear in which it occurs. Gottstein[1] describes a case where tinnitus was present with blepharospasm, and in which he felt justified in concluding that the former symptom was produced by tetanic contraction of the stapedius muscle. In this case pressure on the mastoid process

[1] *Archiv für Ohrenheilkunde*, vol. xvi. p. 61.

temporarily stopped the sound, which is explained by Gottstein on the hypothesis that stimulation of a sensory nerve may have an inhibitory influence on muscle-contraction. We shall see, however, that another author holds a different opinion as to the etiology of those forms of tinnitus which can be temporarily arrested by pressure on the mastoid and spinal regions.

Spasm of the tensor tympani may produce subjective auditory phenomena, partly by causing the sound of muscle-contraction, and partly by forcing the stapes inwards and increasing the intra-labyrinthine tension. Inflammatory shortening of the tendon must of course produce the last-named effect also.

While prepared to admit that a tetanic condition of the middle-ear muscles may be a cause of subjective auditory phenomena, I have difficulty in accepting such an explanation as alone sufficient in cases where tinnitus lasts without intermission for months and years. It is difficult to understand why the middle-ear muscles should become the seat of such a rare lesion as permanent spasm, unless, perhaps, under certain conditions not yet defined, their contraction places the ear under the most favourable condition for the fulfilment of its function, just as we frequently meet with spasm of the ciliary muscle in hypermetropia. As to paralysis of the intrinsic muscles of the middle-ear—a condition on which Mr Field,[1] among others, has laid considerable stress, I can only say that its existence has to be proved before we can describe it as a frequent cause of tinnitus. Vascular changes in the tympanum and labyrinth no doubt are a very common cause of noises in the ears. Many authors consider that where the vessels of the middle-ear are hyperæmic the pulsation of the arteries and the rushing of the venous blood may be perceived as tinnitus aurium. Whether the small vessels of the drum-cavity and its membrane cause vibrations ample enough to produce audible sounds seems doubtful; but it must be remembered that a small arterial twig passes over the foot-plate of the stapes, and its pulsations may thus be communicated directly to the perilymph. Then, again, recent researches have established the existence of an anastomosis between the tympanic and the labyrinthine circulation, so that it is evident that changes in the one must more or less influence the other.

Increased intra-labyrinthine tension can hardly in itself be a cause of continued tinnitus, for, as Dr Woakes[2] points out, pressure sufficient to cause mechanical stimulation would soon lead to atrophy and disintegration. Besides, we have now reason to believe, from the experiments of Bezold,[3] that in obstruction of the Eustachian tube—the condition which was, *par excellence*, supposed to cause increased tension of the perilymph—the tension is really diminished. On the other hand, we know that anchylosis of the stapes and shortening of the tensor tympani are also possible

[1] *Diseases of the Ear*, p. 206. [2] *Deafness, Giddiness, and Noises in the Head.*
[3] *Archiv für Ohrenheilkunde*, xvi.

causes of tinnitus, and there is every probability that in such cases the intra-labyrinthine tension is increased. I believe, then, that any change of tension in the fluid of the internal ear will favour the production of tinnitus—probably by making the pulsations of the labyrinthine vessels perceived. The latter are not noticed during health; but let any change occur—be it in the balance of peri- and endo-lymph, in the calibre of the vessels, or the rapidity of the circulation,—and the case is different. For instance, alcohol may produce tinnitus by increasing the force of the circulation. Noises in the head frequently precede a fainting fit; while, as we shall see further on, the same symptom is produced alike by drugs which dilate, and by those which probably contract, the vessels of the encephalon. A parallel case is the heart-beat, which is not felt under ordinary circumstances, but becomes excessively disagreeable when either abnormally weak or strong.

Dr Weil,[1] of Stuttgart, has noticed that certain forms of tinnitus can be temporarily cured by blowing upon the walls of the meatus; while Türck effected the same object by pressure on the superior cervical vertebra and mastoid process. This result the former ascribes to stimulation of the sympathetic, for during the process (blowing) the pupils dilate, and he very naturally draws the conclusion that those forms of tinnitus which can be thus relieved are due to vascular conditions. In some cases the nature of the subjective phenomena gives a clue to their etiology. Thus, if a beating or hammering sound synchronous with the pulse be heard, its cause may be sought in arterial pulsation. Again, many rushing sounds are due to the venous circulation. In Menière's disease and in primary affection of the cochlea we may, I think, assume that the subjective auditory sensations are in a great measure due to vascular changes in the labyrinth.

Where fluid is present in the tympanum the patient may experience splashing or bubbling sounds, and even have the sensation of liquid moving in the ear.[2] Some persons have the power of producing a clicking sound, which is also audible to others. Sometimes it is so loud that it can be heard by the observer at some distance. It somewhat resembles the sound made by clicking the nails together, and occasionally occurs involuntarily, thus causing much annoyance. Spasmodic action of the palate muscles, and sometimes of the tensor tympani, are the causes to which this symptom is ascribed.

Occasionally, although seldom, noises in the head are complained of by patients who are the subjects of chronic middle-ear suppuration. In these cases the symptom is due to physical conditions similar to those which have been already described, the most common being pressure against the fenestræ produced by the exudation.

[1] *Monatsschrift für Ohrenheilkunde*, November 1881.
[2] Burnett on the Ear, page 430.

So much for those forms of tinnitus which are due to conditions of a part that is studied more by the specialist than by the general practitioner.

We now come to a consideration of those causes of noises in the head which are interesting alike to the aural surgeon and to the physician.

It seems to be the generally accepted opinion of authors that tinnitus may be due to peripheral stimulation of sensory nerves other than the auditory—in fact, the result of a radiated impression.

There are other clinical facts which tend to confirm this view, such as the pain experienced in some cases of asthenopia in which a transference of impression probably occurs from the optic to the fifth nerve. In megrim we frequently meet with disturbance of vision, probably due to central causes, and less frequently deafness and tinnitus aurium,[1] showing that there is a tendency for an impression to be propagated from the auditory centre to that corresponding to the origin of the fifth nerve. Indeed, Poincaré[2] assumes the existence of such a relation to account for the symptoms of pain manifested by animals when the auditory nerve is directly stimulated. Subjective auditory phenomena are found in some cases to be due to the presence of diseased teeth. Wolf observed tinnitus aurium as a result of acute glaucoma, and Weber Liel[3] has traced this symptom to a neurosis of the cervical plexus. Intracranial tumours may cause deafness and tinnitus either by direct pressure upon the auditory nerve or by obstructing the labyrinthine circulation. As observers in medicine have not paid much attention to subjective auditory phenomena, we generally find the symptom either classed with deafness and included under the head of disturbance of hearing, or else, if tinnitus is mentioned, it is only casually alluded to. From what we know of the auditory nerve and labyrinth, however, I think we may conclude that in most cases of deafness due to the presence of a cerebral tumour, tinnitus is likely to occur in the course of the disease.

According to Calmeil,[4] one-ninth of all cases of brain-tumour are accompanied by disordered hearing. Ladame[4] analyzed a number of cases, paying attention to the presence of auditory disturbance, and his results were as follows:—

Number of Cases.	Situation of Tumour.	No. of Cases of Auditory Disturbance.
77	Cerebellar	7
26	Pons	7
27	Middle lobes	3
27	Anterior lobes	0
14	Posterior lobes	0
4	Fourth ventricle	0

[1] Bristowe, *Practice of Medicine*, Megrim.

[2] *Phys. de Syst. Nerv.*

[3] *Lehrbuch des Ohrenheilkunde* (Urbantschitsch), p. 486.

[4] *Pathologische Anatomie des Ohres*, Schwartze; and Ladame, *Symptomatologie und Diagnostik der Hirngeschwülste.*

According to Bernhardt,[1] one of the most recent writers on cerebral tumours, the cases collected by him give the following results. In tumours affecting the corpora striata, optic thalami, and crura cerebri, the hearing power does not suffer; while in those situated in the cortex, aural symptoms occurred twice in fifty-seven cases. In neoplasms of the cerebral lobes, diminished hearing power or subjective aural phenomena (either on the side of the tumour or on the opposite side) seem to have occurred in about one-eleventh of all cases. Where the growth involved the corpora quadrigemina and pineal gland, out of ten cases there was once partial and once complete deafness, while in one case tinnitus was the most prominent symptom.

In tumours of the pons, nearly one-half produced ear-symptoms. To translate the author's words, "Generally hearing was diminished on the side corresponding to the tumour, or it was disturbed by tinnitus. Rarely was there absolute deafness. At the same time the fact must not be lost sight of, that in several cases pathological changes were noticed in the immediate neighbourhood of the pons, and that the auditory nerve was in one case directly pressed upon."

In tumour of the cerebellum, Bernhardt states that auditory disturbance is very frequently present when one of the hemispheres is the seat of disease. Tinnitus and a degree of deafness are commonly met with. Where the morbid growth was situated in the medulla, deafness and tinnitus were present four times in eighteen cases.

We shall next consider pathological conditions of the vessels in the neighbourhood of the ear as a cause of noises in the head, which in these cases are sometimes audible to the observer as well as to the patient. Chemani [2] has recorded a case in which constant and annoying tinnitus was due to a cirsoid aneurism of the auricle, and relieved by its cure. Hutchinson has described a case of aneurism of the common carotid, which had become cured by coagulation. Tinnitus, audible alike to the patient and physician, lasted for a long time afterwards. Aneurismal dilatation of the occipital, temporal, and posterior auricular arteries may also occur.

A very interesting case, in which the last-named artery was affected, and severe pulsating tinnitus was one of the most annoying symptoms, was observed by Herzog.[3] The pulsating tumour in this case lay over the mastoid process, and, when auscultated, yielded a bruit similar to that heard by the patient.

Lebert,[4] in his classical papers on intracranial aneurism, writes:—"Of the greatest interest are disorders of hearing, but we cannot always ascertain in what proportion they are due to changes

[1] *Beiträge zür Sympt. und Diagnost. der Hirngeschwülste*, Berlin, 1881.
[2] Von Troeltsch, *Lehrbuch der Ohrenheilkunde*, p. 563.
[3] *Monatsschrift für Ohrenheilkunde*, August and September 1881.
[4] *Berlin. klin. Wochenschrift*, 1866, p. 347.

in the auditory nerve itself or its nucleus, and to what extent the small internal auditory artery, which is for the most part hidden from ordinary observation, by becoming obliterated, contributes to the result. Tinnitus, impairment of hearing, partial deafness on one side, becoming complete, and at a later stage bilateral, or even bilateral from the beginning, are the symptoms which have been observed. The observations are unfortunately not always complete, *i.e.*, deafness and unilateral deafness are not sufficiently differentiated—which is surely an important point.

"These phenomena are rare where the carotid system is involved. Only once did deafness occur in an aneurism of the posterior communicating artery; once there were deafness and tinnitus in aneurism of the anterior cerebral. Where the middle cerebral was involved, tinnitus was frequently observed, but without deafness.

"On the other hand, there was present in no less than six cases of aneurism of the basilar artery deafness, which came rapidly and was accompanied by tinnitus. As a large number of these cases only came under observation after an apoplectic seizure had occurred, it is fair to assume that auditory phenomena occur even oftener. Disturbance of hearing may, then, under some circumstances, become an important element in the diagnosis of basilar aneurism."

In an elaborate article on pulsating exophthalmos, Sattler[1] mentions beating and rushing sounds in the head as a frequent and very troublesome symptom. So loud is the sound at times, that, without being deaf in the true sense of the word, patients have difficulty in distinguishing other sounds. Compression of the common carotid generally stops the distressing noise temporarily. Usually the murmur can be heard by placing the stethoscope over any part of the side of the head, although it is loudest over the orbit. In these cases of exophthalmos the condition is often due to injury, and after death, aneurism of the ophthalmic artery, aneurism by anastomosis between the carotid artery and cavernous sinus, and thrombosis of the latter, have been found. In one case, after an injury, the pulsating exophthalmos only appeared occasionally, the eyeball being perfectly normal in the intervals. Vaso-motor paralysis of the orbital vessels was the diagnosis arrived at by a process of exclusion.

A very interesting case of tinnitus, audible by means of the stethoscope, and eventually accompanied by exophthalmos, was recorded by Dr Poorten[2] of Riga in 1878. In every case of tinnitus, however, where the symptom is due to an arterial bruit, and where the latter can be heard on auscultation, we are not entitled to make the diagnosis of aneurism. In 1854 Rayer[3] called attention to a case of unilateral pulsating tinnitus, audible to the auscultator, which temporarily ceased on compression of the post-auricular

[1] *Handbuch der Gesammten Augenheilkunde*, Graefe und Saemisch.
[2] *Monatsschrift für Ohrenheilkunde*, 1878, Nr. 4.
[3] Von Troeltsch, *Lehrbuch der Ohrenheilkunde*.

artery. No aneurism or heart-disease was present. In an interesting paper on arterial murmur, Dr Richardson[1] described several cases of bruit in the neighbourhood of the ear, in which tinnitus was a prominent symptom, and yet no aneurism existed. In one patient general treatment effected a complete cure. A similar case was described by Mr Fitzgerald[2] at the Otological Section of the International Congress of last year. He also mentioned a case of audible tinnitus occurring on one side only in a chlorotic girl. A relaxed condition of the arterial walls, or a watery condition of the blood—perhaps both together—might in such cases account for the bruit. It is somewhat more difficult, however, to explain the phenomenon being unilateral. As possible causes one would naturally think of abnormally distributed vessels or disproportion between the carotid canal in the temporal bone, and the calibre of the artery. A limited vaso-motor change, too, must be considered within the bounds of possibility. Whatever be the explanation, the clinical fact remains, that such unilateral murmurs in the neighbourhood of the ear, giving rise to the most distressing tinnitus, may exist without any organic vascular disease and disappear under suitable treatment.

Dr Charles Burnett[3] has described several cases of tinnitus aurium accompanied by other evidence of vaso-motor weakness, such as flushing of the face and upper part of the body. In one patient there was flushing of the side of the face corresponding to the ear in which the subjective phenomenon was most marked.

In some rare cases of heart-disease the cardiac murmur is audible to the patient, as observed by Dr Walshe.[4] It has already been suggested that, although in health the labyrinthine circulation is not perceived, yet when the normal physical conditions are in any way changed or modified, subjective sensations of sound are the result. In discussing this aspect of our subject it seems necessary to take into consideration—

1. The condition of the bloodvessels.
2. The rapidity of the circulation.
3. The quality of the blood.

According to Dr Costa,[5] cerebral anæmia and hyperæmia are alike liable to cause tinnitus aurium. The same author,[6] in a paper on the nervous symptoms of lithæmia, alludes to noises in the ears and deafness as occurring occasionally. He has also observed defects of vision in which the ophthalmoscope revealed congestion of the retina. It seems, therefore, fair to assume that where auditory phenomena exist they are also due to a hyperæmic condition of the internal ear. Murchison[7] has described pulsating

[1] *Medical Times and Gaz.*, 1868, vol. ii. p. 442. [2] *Transactions.*
[3] *Archiv of Ophthalmology and Otology and Diseases of the Ear*, p. 391.
[4] *Diseases of the Heart*, p. 148. [5] *Medical Diagnosis*, p. 70.
[6] *American Journal of Medical Sciences*, vol. lxxxii.
[7] *Lancet*, 1874, p. 538.

and humming tinnitus as of common occurrence in both true gout and lithæmia. Quinine and salicylate of soda have until recently been supposed to produce their physiological effects by causing dilatation of the cephalic vessels, and this hypothesis has derived more or less confirmation from the observations of Graefe, Roosa, and Kirchner.

Roosa [1] noticed, after a moderately large dose of quinine, pinkness of the papillæ and increased calibre of the vessels of the drum membrane. While not pretending to any familiarity with the use of the ophthalmoscope, I may be allowed to suggest that the presence of a pinkish tinge in the disc is hardly sufficient evidence. Had it been stated that vessels became apparent, which before administration of the drug were invisible, the case would be different. It is also well known that several examinations of a healthy meatus by means of a speculum are apt to produce temporary hyperæmia of the tympanic membrane.

Kirchner [2] fed animals on quinine and salicylate of soda, and found on post-mortem examination congestion of the middle-ear and labyrinth. We do not yet know how quinine and salicylate produce death, so that in those animals which died from the effects of the drugs the pathological conditions described may have been due to some change occurring during the agony ; whereas the same argument applies with perhaps greater force to those whose existence was terminated by violence. On the other hand, Grunning, Michel,[3] and Knapp have described cases of quinine amblyopia in which the disc was in a state of almost perfect anæmia, the vessels being hardly perceptible.

Unless we are prepared to attribute to quinine the power of acting upon two separate vaso-motor areas in a diametrically opposite manner, we must, I think, assume that both quinine and salicylate of soda [4] produce tinnitus aurium by diminishing the calibre of the labyrinthine vessels.

Nitrite of amyl, however, which, at least in some persons, produces ringing in the ears, apart from the audible pulsation of the carotids, causes hyperæmia of the retina, so much so that vessels invisible before the inhalation become afterwards well marked, as Deutschmann has observed.

Again, it is fair to assume that the vessels of the labyrinth share the dilating influence, and that in the action of nitrite of amyl, as well as in the tinnitus of lithæmia, increased calibre of the vessels of the internal ear is the cause of the symptom in question.

Mr Field [5] mentions the increased arterial tension of Bright's disease as a common cause of tinnitus. Any obstruction in the venous circulation may produce it, as, for instance, the pressure of

[1] *Diseases of the Ear*, p. 516. [2] *Berlin. klin. Wochenschrift*, 1881, p. 49.
[3] *Archiv für Augenheilkunde*, xi.
[4] Knapp found the same condition (anæmia of the retina) after doses of this drug.—*Graefe's Archiv*, xxvii. [5] *Diseases of the Ear*, chapter xiv.

an enlarged gland or a tight collar[1] upon the veins of the neck. Woakes[2] mentions congestion of the portal system as a possible, if not frequent, cause.

Whether subjective auditory phenomena may not often arise from atheroma of the labyrinthine vessels is a question which requires for its elucidation further clinical research. We have already seen that alike increased and diminished action of the heart may produce the symptom in question, as exemplified by the occurrence of singing in the head after a moderate dose of alcohol, and as a premonitory symptom of syncope.

While believing that tinnitus aurium may be, and very often is, caused by murmurs originating in large vessels in the neighbourhood of the ear, it is yet difficult to avoid the conclusion that the labyrinthine circulation is more frequently the principal cause. This opinion is confirmed by recent observations on the cephalic bruit of anæmia by M. Tripier,[3] whose researches have been discussed and criticised by Dr Gibson.[4]

From a perusal of Tripier's cases it will be seen that tinnitus was usually experienced by those patients in whom the stethoscope detected the cephalic murmur; but that the former generally disappeared before the bruit ceased to be audible to the auscultator. Through the kindness of Drs Gibson, Brakenridge, and Dowie, I have been enabled to examine a number of patients in whom the cephalic bruit was present, and have found that the sound perceived by the patient is either rushing or hammering (venous or arterial). In some cases the tinnitus is only present after the patient has retired to rest, while the murmur can be detected in the upright posture.

It seems, therefore, a justifiable conclusion from these facts that the tinnitus of anæmia is not altogether or even chiefly due to murmurs produced in the large vessels, but probably owes its origin to conditions affecting the circulation of the internal ear. Chlorosis is in all probability a much more common cause of this distressing symptom than is generally supposed. Indeed, in the comparatively few cases I have had an opportunity of examining, it was rarely absent.

In 1874, Dr Moos of Heidelberg,[5] relying on data derived chiefly from the post-mortem examination of a patient who was said during life to suffer from auditory hallucinations, and whose external auditory passages were filled with wax—a condition usually considered capable of producing tinnitus—suggested that many cases of subjective auditory phenomena may be due to an abnormal condition of the jugular bulb, such as existed in this case. Rüdinger disputed these conclusions, and pointed out that the condition of the latter described by Moos was not uncommon.

[1] Von Troeltsch, *Lehrbuch der Ohrenheilkunde*, p. 561.
[2] *Op. cit.*, p. 161.
[3] *Revue de Médecine*, 1881. [4] *Brit. Med. Journal*, January 21, 1882.
[5] *Archiv of Ophthalmology and Otology*, 1874.

In the light of our present knowledge of the cephalic murmur of anæmia, we should expect that where a sound loud enough to be heard by the patient is produced in the large vessels near the ear, it would also be audible by means of the stethoscope to the physicians.

As deductions from what has been said, I would suggest the following points:—

1. Hyperæsthesia of the auditory nerve, while it may be a predisposing cause of tinnitus, is never the direct exciting cause.
2. The ear should be examined in every case in which the cause of the symptom is doubtful.
3. While tinnitus may be caused by numerous and varying conditions, yet the auto-perception through the auditory nerve of the labyrinthine circulation is a very common factor.
4. In certain cases the results of an ophthalmoscopic examination may by analogy assist in determining whether the condition of the labyrinth be one of hyperæmia or anæmia.
5. The indications for treatment vary altogether according to the cause of the subjective phenomena.

The President said the full importance of this subject none could realize till they had a troublesome case under their own management. One of the worst he had ever seen was in the person of a remarkably fine-looking individual, and in her case it was entirely due to spanæmia, and was improved under drugs applied to the state of her blood. Her hæmoglobin was deficient, and as soon as it was restored to something like a normal condition she immediately got quite well. The Society was much indebted to Dr M'Bride for his most able and interesting paper.

Dr Kirk Duncanson agreed with what the President had said as to the value of Dr M'Bride's paper. It must have cost him a great deal of labour to get up all the facts and theories as he had done. The paper was one that he should like to read before saying much about it. He might state that he had just read of a rather remarkable cause of objective tinnitus aurium. He had got to hand, last night, the *American Journal of Otology*, in which there was an article on this subject. One case was given of a doctor in a pretty extensive practice who suffered from a crackling noise in his ears every night just after going to bed. He had no time to consult an aurist, but happened to mention his sufferings to one of his lady patients, who told him of a case she knew where the noise was found to be due to maggots in the pillow. The doctor examined his own pillow when he got home, and found plenty maggots, the pillow having gone far on the way to decay. A new pillow cured him.

IV. *Dr Batty Tuke* read his paper entitled

NOTE ON THE ANATOMY OF THE PIA MATER.

In the most recently published standard work on anatomy, Turner's *Introduction to Human Anatomy*, we find the membranes of the brain described as threefold—the dura mater, the arachnoid, and the pia mater. I take the liberty of quoting largely from this admirable work, and of criticising its statements, as it is certain to contain the most recent and the most generally received opinion of anatomists.

The dura mater is described as a tough fibrous membrane, the inner surface of which has the appearance of a mucous membrane, and is covered by a layer of squamous cells. "The dura mater is well provided with lymph vessels, which in all probability open by stomata on the free inner surface." The description of the membrane concludes thus:—"Between the dura mater and the arachnoid membrane is a space of only a capillary lumen, containing a minute quantity of limpid serum, which moistens the smooth inner surface of the dura, and the corresponding smooth outer surface of the arachnoid. It is regarded as equivalent to the cavity of a serous membrane, and is named the *arachnoid cavity*, or, more appropriately, the *sub-dural space*."

The *arachnoid* is described as "a non-vascular connective tissue membrane of great delicacy and transparency, which envelops both the brain and spinal cord. *It is separated from these organs by the pia mater; but between it and the latter membrane is a distinct space, called sub-arachnoid.*[1] The free surface next the sub-dural space is smooth and covered by a layer of squamous endothelium. The opposite surface is connected to the pia by threads and membranes of delicate sub-arachnoid connective tissue which traverse the sub-arachnoid space and divide it into numerous loculi freely communicating with each other. The connexion is much closer opposite the summits of the convolutions than opposite the sulci between them, for the arachnoid does not dip between the convolutions: it is loose also opposite the interpeduncular space and around the pons, medulla, and spinal cord, in which localities, therefore, the sub-arachnoid space is most distinct. . . . . *Endothelial cells line the inner surface of the arachnoid, cover the outer surface of the pia, and invest the various bands and membranes which traverse the sub-arachnoid space.*" [1]

Of the *pia mater* it is said, "This tender *vascular* membrane consists of delicate connective tissue closely investing the whole outer surface of the brain and cord. It dips into the fissures between the convolutions. . . . . *The arteries of the brain and spinal cord ramify and divide into small branches in the pia mater and sub-arachnoid tissue*[1] before they penetrate the nervous substance, and the veins conveying the blood from the nerve

[1] The italics are my own.

centres traverse these membranes before they open into the blood sinuses of the cranial dura mater and into the extra-dural venous plexus of the spinal canal. . . . . The vessels which pass from the pia mater into the brain and spinal cord are invested by a loose funnel-shaped sheath, which has been described as forming the wall of a perivascular lymphatic vessel; but Axel Key and Retzius consider that the space between the bloodvessel and the sheath opens into the sub-arachnoid space, and contains sub-arachnoid fluid. A network of lymph vessels ramifies freely *in* the pia mater."

If we reduce these statements to a diagrammatic scheme (Figure 1), we have, *1st*, the vascular dura mater; *2nd*, a sub-dural space; *3rd*, a non-vascular fibrous membrane, the arachnoid; *4th*, a sub-arachnoid space; and *5th*, a vascular membrane dipping into all the sulci.

Reference to the drawings illustrating this paper will, I think, convince the observer that a modification of this view of the membranes must be adopted. Certain of the sections from which these drawings were made were taken from the brains of monkeys recently killed, others from human brains. The organs were removed from the calvaria after careful reflection of the dura mater, all the other investments being left *in situ*, hardened in chromic acid, and thin sections were cut perpendicularly to the plane of the surface.

Study of these specimens shows that over the curved surface of each convolution a membrane exists investing it closely. This membrane, the pia mater, consists of two layers of a distinctly fibrous character, for the most part intimately bound together by connective tissue, so intimately as to be inseparable, and to give us every right to consider it as one membrane. *Between these two layers, and in the connective tissue, the vessels permeate. No membrane external to this exists except the dura mater.* But when this investment approaches a sulcus, the two layers separate, the outer bridging the fissure, the inner dipping into it and closely investing its surface throughout all its ramifications, being reflected at the extremities of the sulcus, and becoming continuous on emerging from it with the bridging layer. In the angular space thus formed the arteries lie naked, or at most are supported by very fine fibrous trabeculæ; but as they enter the brain substance they receive from the investing layer fine hyaline sheaths (Diagram 2).

It is true that over the sulci, over the interpeduncular recess, and over the wide gap between the cerebellum and the medulla oblongata, a purely fibrous membrane exists; but when we refer to microscopic sections an explanation of its true character is obtained. It is found to be the outer layer of the vascular pia mater, which in these positions is separated widely from the inner layer and bridges the fissures and spaces.[1] Over the cerebellum these two

[1] It has been suggested to me by Mr Symington that an analogue of this arrangement is found in the *falx cerebri, falx cerebelli, and tentorium cerebelli.*

layers are much less intimately connected by interstitial connective tissue than over the cerebrum. Over the spinal cord the two layers are completely separated, the inner very closely investing the organ, the outer becoming thick and coarse, loosely enveloping the cord, and being separated from the inner layer by vessels and bundles of nerves as they enter or emerge. This thick, definite membrane is, however, distinctly continuous with the outer layer of the cerebral pia mater.

From these observations I am forced to the conclusion that a separate arachnoid membrane does not exist—that the name should be dispensed with, and, as a corollary, that the theory of the existence of a sub-arachnoid space should be departed from; that we should speak of only two membranes of the brain and spinal cord, the *dura mater* and the *pia mater*, and of two spaces, the *sub-dural space* and the *intra-pia-matral space or spaces*.

Slight consideration will show that something much more important than mere accuracy of anatomical description is involved in this contention, although that is in itself a not inconsiderable matter. The practically important question is, What relation do the pia-matral spaces hold to the vessels and lymphatics of the brain?

Between each convolution a pia-matral space exists, and it is easily demonstrable by injections that they communicate freely with one another on the surface of the cerebrum by wide channels. Over the cerebellum and at the base of the cerebrum they become larger, but not actually continuous. Around the spinal cord the pia-matral space is continuous. In my opening statement I said that the inner layer of pia mater affords fine hyaline sheaths to the arteries as they enter the brain. This opinion was grounded on the writings of Robin, His, Fohmann and Arnold, Key and Retzius, Boll, Rindfleisch, and on my own observations. I present to you specimens which show the sheath as it enters the cerebral substance (Fig. 4), and as it loosely encapsulates the vessel in the interior of the brain. Although the existence of these perivascular hyaline sheaths is now an acknowledged fact in anatomy, the manner in which they debouch on the surface of the brain is not clearly stated, in consequence, I believe, of the prevalence of the theory of the presence of an arachnoid membrane apart from the pia mater, and of a sub-arachnoid space. Boll held that they empty themselves into a space which he called the great epi-cerebral lymph space, and which he believed to exist between the pia mater and the cerebral substance. This position is quite untenable, for the hyaline membrane is a prolongation of the inner layer of pia mater; how, then, can the channels they form debouch *below* that membrane? Key and Retzius ridicule this idea, but assert that the hyaline perivascular sheaths debouch into the sub-arachnoid space. It is needless to reiterate my arguments in proof of the non-existence of such a cavity; but

Fig. 1.

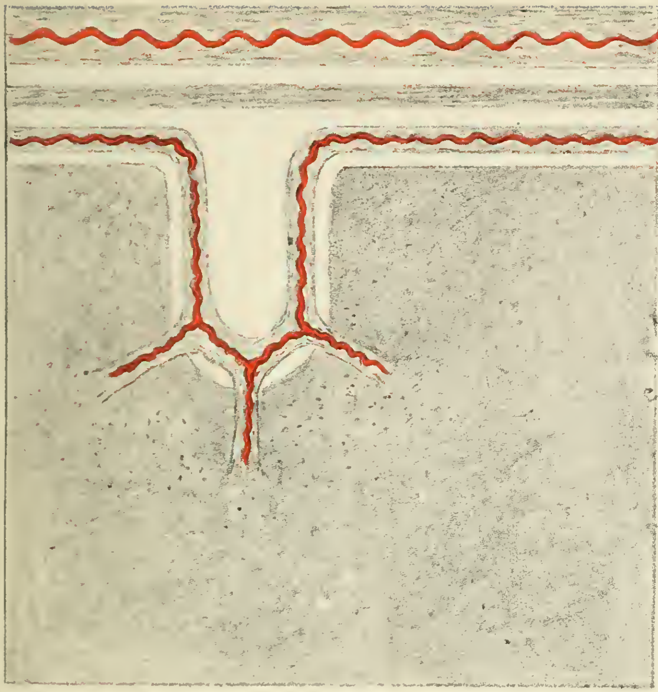
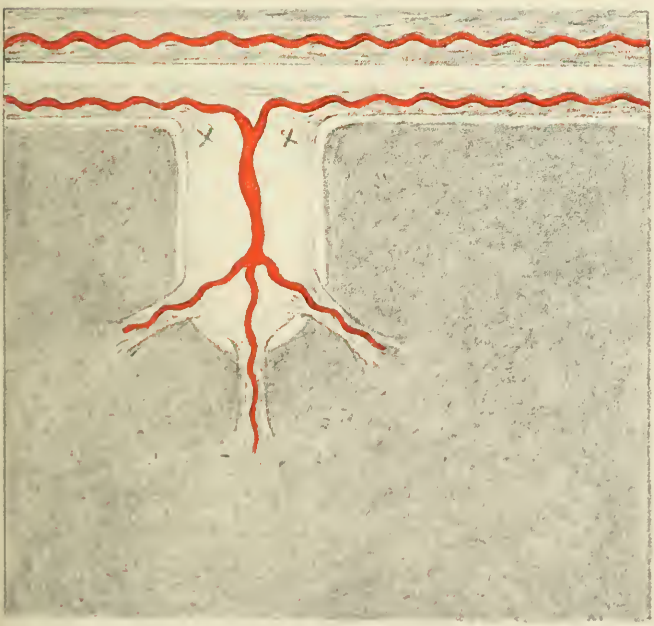
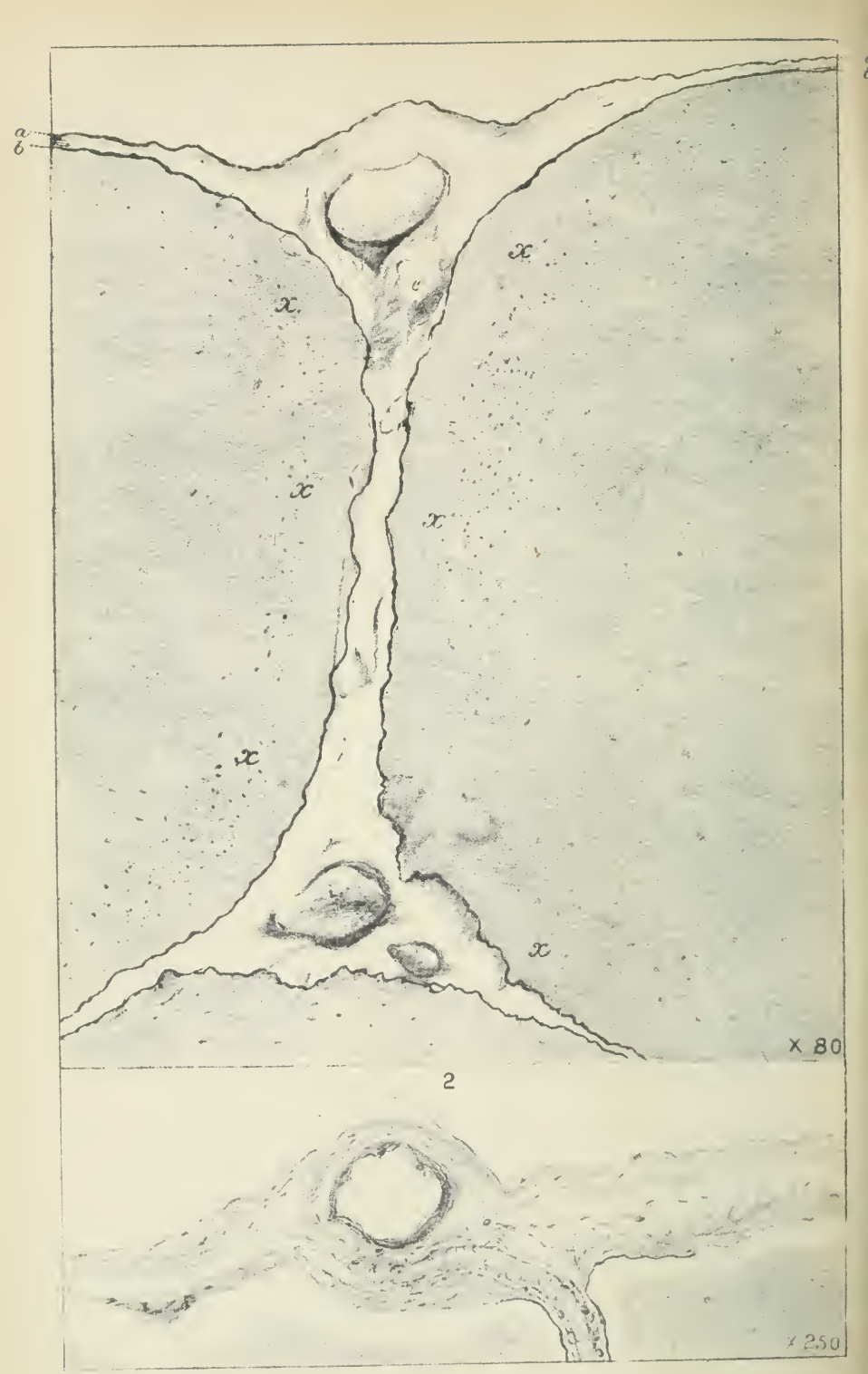


Fig. 2





J B T, Lith

admitting its existence for a moment for the sake of argument, how are Key and Retzius to overcome the difficulty of the intervening vascular pia mater, which must, if their theory be correct, be penetrated by the sheaths before they could reach it?

The simple and plain fact is that these channels debouch along with the vessels into the cavities of the pia mater, as shown in Diagram No. 2.

It is now pretty generally held that these conduits are lymphatics. Key and Retzius assert that by their means free communication is obtained between the ventricles of the brain and its outer surface. The anastomosis between the arteries supplying the tracts around the lateral ventricles and those entering the outer surface renders this statement easily appreciable. Obersteiner holds that by certain "spur-like" processes there is maintained a lymphatic communication between spaces surrounding each nerve-cell and the perivascular lymph spaces. He has proved this by injections. But whether we regard them as lymph conduits, or as channels for the transference of cerebro-spinal fluid from the brain to the spinal canal, or as serving both purposes, the position I have asserted renders the route taken by fluid discernible. No patent route is open if we hold to the usual statement of a vascular pia mater encapsulating the cerebrum, on which is superimposed a fibrous arachnoid, for the simple reason that any perivascular conduit must needs penetrate the pia mater before it could reach a space between that investment and an arachnoid membrane. But if we hold to a vascular pia mater with broad interconvolutional spaces which communicate freely one with the other and with a wide intra-pia-matral space in the spinal canal, the transference of fluid is easily comprehensible.

To the pathologist the question is of great importance, as it involves the possible consequences to brain health which may be brought about by the interruption of the route by distention of vessels.

DESCRIPTION OF PLATES.

Diagrams.

FIG. 1. Projection of membranes and spaces according to the usually accepted anatomical description. V. D. M., Vascular dura mater: S. D., Sub-dural space or sac of arachnoid; F., Fibrous non-vascular arachnoid; S. A., Sub-arachnoid space; V. P. M., Vascular pia mater, dipping as a whole into a sulcus.

FIG. 2. Projection of membranes and spaces as indicated in the paper. V. D. M., Vascular dura mater; S. D., Sub-dural space; V. P.M., Vascular pia mater, outer layer bridging a sulcus, inner layer investing surface of sulcus, and affording fine hyaline sheaths to the vessels; × ×, A Pia-matral space, bounded by the inner layer investing a sulcus, and superiorly by the bridging layer: in it the vessels lie naked or receive support from trabeculæ; into it the hyaline sheaths debouch.

Lithographs.

No. 1, taken from a section of a monkey's brain, shows pia mater as a two-layered membrane at *a b*, and *a b*, and behaving as stated above. The cut ends of vessels are seen supported by trabeculæ ; *x x*, Brain substance. × 80.

No. 2, from a human brain, shows a vessel in the pia mater, on the summit of a convolution, sending a branch into the brain substance, surrounded by a hyaline sheath. The sheath is represented somewhat too strongly. The communicating pia-matral space is shown between the fibrous tissue of the two layers. × 250.

Dr D. J. Hamilton agreed with Dr Tuke in his views regarding the arachnoid—that it should not be considered a separate membrane, but rather the outer layer of the pia mater. He hoped soon to show the Society specimens in which it was quite plain that the arachnoid had no existence as a separate and distinct membrane. Dr Tuke's description of the membranes, especially in connexion with the vessels, was infinitely more comprehensible than the old one. There was almost a spongy structure in some places, connecting the pia mater with what was called the arachnoid. In some brains this was much more marked than others. Preparations should be well injected to show this structure.

Dr Clouston said that, even granted the description Dr Tuke had given was correct, and assuming that the two membranes were practically identical, it came to be a question whether it was not a matter of convenience to give the outer layer of the pia mater another name, as it was certain that the functions of the two were different ; the outer being to allow the brain a certain amount of motion, and the inner to act as a mesh-work to hold the vessels and lymphatics. In extreme atrophy of the brain at the end of general paralysis the arachnoid membrane was separated entirely, even over the convexity of the convolutions, by a pretty wide interval (sometimes as much as an eighth of an inch) from the pia mater, and only attached to it by a number of trabeculæ. The pathological changes to which the two membranes were subject were different in most cases. Even the microscopic appearance of the two was different when examined fresh or in frozen sections, and where the tissue had not been hardened and altered in appearance by reagents, as in the sections shown by Dr Tuke.

Dr Tuke, in reply, could not consider it convenient to adhere to error. He had endeavoured to show how much inconvenience had been caused by the prevalence of the erroneous theory of the existence of a separate arachnoid membrane. It had obscured the perception of the arrangement of the cerebral lymphatics. It was not usual to have anatomical nomenclature on the appearances of structures in a state of disease.

V. *Dr Clouston* read his paper entitled

ALTERNATION, PERIODICITY, AND RELAPSE IN MENTAL DISEASES.

One of the most fundamental of the laws that govern the higher functions of the nervous centres in all vertebrates is that of alternation and periodicity of activity and inactivity. In all the higher species of the class the periods of inactivity are marked by unconsciousness, and are often combined with the mental phenomena of dreaming and muscular expressions or equivalents of ideation, both of which are quite as strange and inexplicable in their essential nature as the phenomena of mental disease. Both may be in a general way understood by reference to mentalization as a brain function. Neither are in any way comprehensible on any mere mind theory apart from brain. The sleep and waking periodicity of the higher brain functions is the foundation and type of all the other periodicities which exist in the nervous functions, and they are not a few. The yearly hybernation of many animals, the daily periodic rises and falls of body temperature, the daily increase and decrease of the pulsations of the heart and of the cardiac pressure, the periodic returns of the appetites for food and drink, and of the activities of the glands and involuntary muscles through which food is digested and assimilated, are all examples of secondary nervous periodicities which occur in the course of the daily life of the organism. When we look at the function of reproduction of the organism, we find that every activity and process is subject to laws of periodicity of the most marked character, and there can be no doubt that these all have their origin in the brain. The period of reproductive activity is always, in both sexes, the period of greatest physiological mental exaltation. The periodic rutting season in male animals, with its courage, pride, activity, display, pugnacity, and restlessness, the young-bearing and suckling period in females, with its increased courage, skill, cunning, protective and providing instincts, show how the functions of the brain are affected by the reproductive periodicity. So much are they affected that the mental characteristics of some animals are completely changed from their natural condition and reversed, the timid becoming bold and the shy obtrusive; hereditary and natural antipathies and fears disappear for the time, the habits change, night-feeders becoming day-feeders, etc. We should not approach the study of the periodicity of symptoms in nervous and mental diseases without keeping in mind these laws and facts of the physiological periodicity of normal nerve function wherever we have a higher nervous system. Looking at the mental activities of human beings, we find them strongly influenced by the physiological periodicities. What man is there who is not emotionally more elevated or depressed, more

active or inactive in mind, at certain times, or at his periods of almost regularly recurring reproductive desire and capacity? What woman is exactly the same in mind before, during, and after menstruation, and during pregnancy or lactation? And the instant we pass from absolutely healthy brains, all those periodicities count for far more in the mental life, their effect in dulling, elevating, and depressing being far greater. There are thousands of sane men and women who are regularly duller in the morning and more lively in the evening, or the reverse; or who are duller in the winter and more elevated in the summer; or who are more irritable—that is, have diminished inhibitory power—at periodic intervals, or who are subject to "moods" and "tempers" periodically. There are many persons whose mental life is one long alternation of "action" and "reaction," activity and torpor, by a natural law of their organization. When we look at diseases of the nervous system other than the mental, we find many of them often markedly periodic in their symptoms and times of recurrence. I need only instance neuralgia, migraine, and, above all, epilepsy, that motor analogue of many mental diseases. Such a disease as ague I regard as proved to be neurotic from its periodicity alone.

Two French writers, Falret and Baillarger, were the first to describe as a special form of insanity certain cases in which there are regularly alternating and recurring periods of mental exaltation, depression, and sanity, and to call it *folie circulaire*. Each of these may vary in absolute duration from a day to several years, and in relative duration to the other conditions in the circuit in different cases; but they always recur and follow each other with more or less regularity for years. In some the period of exaltation is long and the depression and sanity short; in others this is reversed. But in the really typical case the periods are, or should be, each about the same length in each psychological circle, and the recurring circles all about the same size. Usually there is something special about the exaltation and depression. The exaltation is very pure brain exaltation, with often hyperæsthesia and exaltation of many of the nervous functions with much reasoning power left, but little self-control or common sense, the condition described by the French as *folie raisonnante*, or Pritchard's moral insanity, being quite marked at the early stage. There is in nearly all the cases great increase of the reproductive nisus. The phases of the exaltation, down even to small things, recur regularly in different attacks at the same time. The depression is apt to be characterized by apathy and torpor rather than intense mental pain; there are seldom any strong suicidal feelings or impulses. And the period of sanity is apt to be a sort of stupid, inactive sanity, wanting in volitional power, full affectiveness, and spontaneity. The mental balance goes on oscillating between melancholia and mania, standing still at the happy mean of ap-

parent sanity just long enough to raise hopes that recovery has taken place for a few times till the nature of the disease is apparent to the physician, and as often as they occur to all-hoping relatives. It is a very incurable disease, and the bad cases are usually found in asylums rather than treated at home.

The interest of this form of mental disease is small when it is merely looked at as a rare psychosis of typical form; but it is very great indeed to the student of psychiatry when, in the first place, we make it a means of studying the clinical differences in the whole brain and body state of the same patient in exaltation, depression, and sanity respectively, and when, in the second place, we look on it as a pathological illustration of the great physiological periodicities to which I have referred, and of the almost constant tendency there is in nearly all cases of insanity, or at least in most of those that are hereditary, towards relapse, alternation, periodicity, or sympathy with exalted physiological function.

The following are some illustrative cases :—

D. A., æt. 49 on admission to Asylum. He had never been placed in a hospital for the insane before, though he had had from his boyhood dull times and active times, and many slighter attacks of the kind I am about to describe for five or six years previous to his admission. In one of those, while holding an important position in India, he had got two tiger cubs, and used to try and drive them in harness through the street of the Residency. His education was good, his temperament sanguine. He had been reckoned proud and retiring, and he was of an old and distinguished family. In bodily conformation, carriage, and bearing he was the type of an aristocrat. A paternal uncle, at least, had been insane, and had shown periodicity. His family had been a very artistic one, but he had never, when sane, shown any talent in that way. He had married and had children.

Just before admission he had been spending money recklessly, proposing marriage to many suitable and unsuitable persons, getting into passions and using threats about trifles, reckless, eccentric, changeful as the winds in intention and execution. The attack was coming on, but had not come to a height till a week after a domestic loss.

When admitted he was much excited and very indignant, calling on all to witness that he was illegally imprisoned, threatening the dire vengeance of the law on all who had to do with it, but in about ten minutes he was most jolly, and amusing himself with a game of billiards. At first he was exalted mentally, but had much self-control. His excitement consisted in a constant restlessness, a perpetual twisting movement and play of his facial muscles. He could not sit still, or read, or engage in a game, or talk of one subject for long. He talked much, and could not stick to one subject; he was boastful in a way that was to him unnatural; he talked of his private affairs, and would indulge in very pointed

questions and remarks, without much regard to your feelings. To a good billiard-player, "I'll give you fifty points, and bet a pair of gloves I'll beat you. I don't want to hurt your feelings, but I suppose you know your style of play is not very fine." To a man who had been in trade, "What do you think of my stockings, Mr ——? That was in your line." He was often extremely amusing, fluent, and witty, which in health was foreign to him. He would rattle off Scotch to the pauper patients in the grounds, French to the ladies, and Hindostanee to himself in a way he could never do when well. In dress he was untidy, and in habits dirty. To the ladies, of whose society he was extremely fond, he was exaggeratedly polite, with the grand air of the olden time; but if they gave him any encouragement he would soon become too familiar. He was always giving them flowers, which he had stolen, and writing them notes, or trying to kiss the maid-servants. If he had any request to make from a lady in the drawing-room, it was no uncommon thing for him to go down on one knee, with his hand to his heart, and all this done most gracefully and amusingly, as if half in fun and much in earnest.

He smoked as much as he could get, and was always grumbling he did not get cigars and tobacco enough, and begging, borrowing, or stealing more. He ate enormously, but not nicely, of everything that came in his way. He picked up and appropriated everything belonging to others that he had a fancy for, and did this also most gracefully, as if it was the most natural thing in the world. He was irritable when controlled, contradicted, or refused requests, and he was always making innumerable most impossible requests. He slept badly, and would, if allowed, sit up all night, or get up and move about by three or four o'clock. He was not susceptible to cold, sitting with all his windows down in winter.

He passed gradually out of one stage into another. The next stage was a more maniacal one. He dressed more grotesquely, and always wanted to put on three or four coats, vests, or trousers on the top of each other. He would come in to a dance with four vests, would go behind a door or another man, and slip one and then another off as he got warm. His habits and ways got more dirty and disorderly. His irritability took violent forms, assaulting his attendants, smashing furniture, etc. His conduct became so uncontrolled that he could not go to the drawing-room or to church. He would run after a petticoat without regard to the appearance or age of its wearer. His whole tastes as to food were the opposite to what they were in health. He liked porridge, which he could not abide when well, and if he did not feel inclined to take it, he would turn it out on to his newspaper, put it in his pocket, and eat it when he felt hungry. He would mix up soup, milk, and claret, and eat them together. Scarcely anything was incongruous or disgusting to him. He wore his hair very short, and would singe it or cut it himself if he could get no one

else to do it. He would, in playing cricket, strip himself almost naked, or put on the most ridiculous things, a woman's hat or shawl, a cap turned outside in, etc. He turned up at morning prayers one day in buckskin tights, a red vest, a blue cap, and black swallow-tail. His bowels were always moved twice or thrice a day. During all this time he was losing or tending to lose weight in spite of all he ate. He had his better and worse days all through, usually in alternation. He used to paint and draw pictures and portraits at this stage, producing the vilest daubs, spitting on the paper to moisten his colours, and using his hand and fingers to spread his paints. These he would carry in his pocket by the dozen, showing them to any one he met—and he could pass no one without speaking. He said he had never known he could paint before. So with singing: he would sing in discord and think he was doing splendidly. Yet with all this there never left him a certain jauntiness and grace of manner. No one, at his worst, could have taken him for anybody but a high-bred gentleman.

As this brain exaltation came on and increased, each successive attack, each little phase, each little morbid way, such as smoking, eating certain things, cutting or singeing his hair and beard, painting, putting on one coat on the top of another, would recur with the regularity of the bud, leaf, and fruit of a tree.

The next stage was the gradual passing off of all these symptoms of maniacal exaltation, and a resumption of his former habits and ways and appearance.

The first stage, corresponding to simple mania, lasted for about a month; the second, with the symptoms of mild acute mania, about two months, and his recovering stage about three months, so that the whole period of exaltation lasted six months; but he did not stop at the same stage. He at once passed into a condition of great mental depression. To see him in that, one would scarcely have known him to be the same man. His hair well grown, his whiskers trim, his features and eyes dull and inexpressive, his dress most scrupulous and neat, his manner distant and nervous; in speech reticent, and never venturing a remark; in feeling depressed, fearful, and unreliant. He thought he was so wicked that he should not see any one. He now disliked most of the people he had cultivated during his exaltation, especially relying on the chief attendant, who had controlled him most, and whom he had most heartily abused. His habits were sedentary, he could scarcely be got to go for a walk; his appetite was most moderate, and his tastes most particular, not being able to bear the smell of tobacco or to look at porridge or messes of any kind, and most sensitive to dirt and bad smells. He was very penurious about money. He was always thinking he was doing wrong or giving offence, and did not like company, while he was most moral and religious in his feelings and habits. His whole intellectual and affective life was far more

unlike his exalted self than one average man is unlike another. He was stationary in weight at first, but soon began to gain. He was most sensitive to cold and draughts and loud noises, in all of which he had delighted before. He was full of a morbid sorrow and regret for his previous conduct; but he was morbidly suspicious at this stage, and used to think that the things he had given away or destroyed during his excitement had been stolen. This condition lasted for about three months, gradually passing into one of complete sanity, without depression or elevation, but with some inertness at first, and without much capacity for business. This lasted about six months, and then the signs of elevation again began. Altogether the circle of elevation, depression, and sanity had lasted about fifteen months. There was no marked line anywhere, though the most distinct and sudden transition was between the elevation and the depression.

The development of the exaltation next time was a slow process, taking about two months before it got so bad that he had to come back to the Asylum. The sort of things he did were going out to ride at 10 o'clock P.M., never going to bed, smoking all the time, foolishly wasting his money, proposing to marry ladies and women suitable and unsuitable, sometimes two in a day, telling one, as an inducement to accept him, that if she would marry him she could put him into an asylum and enjoy his pension! He went into a shop to buy a pair of gloves, and the shop-girl taking his fancy, he went down on his knees to her, telling her he had fallen in love with her. His *nisus generativus* was always exalted during the excitement, but more in idea than fact. He was always saying that if castrated he would be cured. The great difficulty at this stage was to get "facts" indicating insanity to put in the medical certificates for his admission to an asylum, for he was very acute, and knew what a doctor's visit meant quite well!

In the second circle of his disease after coming to the Asylum, all the symptoms were similar to the first, and developed themselves in the same order. The excitement was more acutely maniacal than it ever was before or has been since. The whole period of elevation was a year this time, of the depression six months, and the sanity six months, the circle taking two years to get through.

The third circle had a period of excitement of ten months, of depression of six months, and of eight months of sanity—in all, two years. The fourth circle had a period of excitement of thirteen months, of depression of about six months, and of sanity of fourteen months—in all, two years and nine months. He was out of the Asylum, living at home, for a year and eight months during part of the depression, the whole period of sanity, and the first month of the commencement of the excitement. He did not enjoy the society of his relations during the depression, and they said he would have been better to have been in the Asylum; and at the beginning of the excitement, when they had to remonstrate

with or control him, his affection for them ceased, and he got on worse with them than in the Asylum with strangers. He said cruel and unkind things to them and reproached them.

In the fifth alternation the excitement lasted two years, the depression twelve months, and the sanity fifteen months—the whole thus taking four years and three months. He is now in the exalted stage of the sixth circle, and is going through all the usual symptoms, but none of them are so severe as they were; and it seems as if, at 62, his brain was not capable of taking on so acute an attack of excitement, the violence not being so great, and he is now capable of being soon tired, and takes rest, which he never did before, and the diurnal changes are very marked. He has one good and then a bad day. But the eroticism, the alertness and grace of movement, the kleptomaniacal tendencies, the small phases of his exaltation, are still there, and there is no trace of the mental enfeeblement of dementia, of bodily exhaustion, or of chronic mania. The damage done to the organ by the previous attacks of exalted morbid energizing has evidently been repaired in the intervals of sanity, during which he lays on flesh greatly. The bromide of potassium alone and combined with cannabis indica did not influence one of the attacks of excitement when tried.

The following is the record of a case of most prolonged and, on the whole, one of the most regularly alternating cases of *folie circulaire* in short circles I have ever seen:—

D. E., æt. 30, was admitted to the Royal Edinburgh Asylum in 1847 without any history whatever, but she was a person of education and intelligence, though sent as a pauper patient. She laboured under all the symptoms of acute mania at first, and in a few days it was recorded that she was "imbecile," then in a few days more that she was quite well. Since that time till now—for thirty-five years—she has had regularly recurring short attacks of acute mania, during which she is restless, incoherent, excited, destructive to her clothing, violent, and with no memory or consciousness of familiar things or persons, this lasting from a week to four weeks usually. This is succeeded by a few days of a condition with all the symptoms of dementia, with a little depression, and she then becomes practically sane for a period of from a fortnight to four weeks. Her circle takes from four to eight weeks to complete, enfeeblement of mind taking the place of the more usual depression. We have a wonderfully complete record of her symptoms all these thirty-five years; and though once or twice there are such entries as "She is now almost continuously excited," as in 1852 for a month or so, or "Periods of excitement more frequent, of quiet shorter," as in 1853 or in 1861, "Intervals of quiet longer," as in 1862, yet the irregularities are no greater than are common in regard to menstruation in the average woman. There can be no doubt that this is a case of mental alternations

governed by the menstrual periodicity. For long she had amenorrhœa, but the return of the catamenia made no difference, and, more strange, the ceasing of menstruation at the climacteric made no difference. Now, at 65, the regular alternations of acute exaltation, dementia, and sanity are as regular as ever, though the symptoms of the exaltation are scarcely so acutely maniacal as at first. The whole case is otherwise instructive, for though it shows the known tendency in a brain for acute excitement to exhaust and destroy the normal power of energizing of the convolutions and produce that diseased mentalization which we call dementia, it also shows this, that more severe attacks, when short, produce only a short dementia, which is recovered from soon. Most instructively of all, it shows that over 200 of such attacks, continued for such an enormously long period as thirty-five years, may not destroy the mental power of the brain and produce complete and permanent dementia. The brain in this proves the recuperative and resistive power that it shows in many other ways, if the periods of the exalted energizing, or the strain, or the poisoning, or the morbidness is only short in time, and the organ gets rest between one attack and the next. We all know that periodic sprees may be continued with impunity in many people for a lifetime, and that many men may work their brains at full pressure for many years if they give them a Sunday rest and an annual holiday.

I had another case, a lady, D. K., who was for ten years in the Asylum, who took attacks of excitement lasting about a fortnight alternating with periods of depression for a week, but in her case, as in that of D. B., the depression immediately preceded the excitement, and the periods of sanity were of about three weeks' duration. But, like all the rest, the length of the periods of the different conditions was not absolutely uniform. In her case, also, the regular alternations recurred up to the age of 78, when she died, and kept up in a mild form during the last six months of her life, when she had a broken leg, an ulcerated and sloughing ankle, and was extremely exhausted. But her mind was enfeebled during the quiet "sane" periods for the last ten years of her life, and she had sexual delusions about people wanting to marry her. The exhausting effects of the excitement on her brain, as in most of the circular cases, were aggravated by addiction to masturbation during those periods.

I have under my care a gentleman now, aged 49, D. D., who for the past twenty-six years has been subject to the most regularly recurring brain exaltation every four weeks almost to a day. It sometimes passes off without becoming acutely maniacal or even showing itself in outward acts; at other times it becomes so, and lasts for periods of from one to four weeks. It is always preceded by an uncomfortable feeling in the head and pain in the back, a mental hebetude and slight de-

pression. The *nisus generativus* is greatly increased, and he says that if in that condition he has full and free seminal emission during sleep the excitement passes off; if not, it goes on. Full doses of the bromide or iodide of potassium have the effect often, but not always, of stopping the excitement, and a very long walk will sometimes do the same. When the exaltation gets to a height it is followed always by about a week of stupid depression. It seems as if the depression in those cases always was and meant a reaction after morbid over-action—a muddy mental calm after a storm, an anæsthesia after a hyperæsthesia.

In the following case the alternations began in old age—D. C., æt. 74 on admission, unmarried, had had several attacks of excitement in the three years previously. A sister is insane, and brother hemiplegic with periodic attacks of mild mental exaltation, which also came on in advanced life. But the patient had been a staid, industrious man, who had been in business all his life, and done his work well till he was over 70, leading a sober life. He has been excited for three months. It began at first by great mental exaltation and hilarity of manner. He was very fond of the ladies, but never erotic. Especially he used to laugh most immoderately at nothing in particular, putting down his stick into the ground, and bending forward and roaring with laughter for from five to ten minutes running. It had exactly the effect of a man laughing well and continuously on the stage, at a cause of which you are ignorant, it was catching, and you could not help laughing too. This gradually passed into a stage of violence, fancying insults, shouting, sleeplessness, and suspicion. During this stage his temperature was always over 99°, he ate enormously, craved stimulants, his bowels were moved twice a day, and he slept little. His conduct was extremely ridiculous for an old man. His delusions were mere fleeting fancies, suspicions, etc. In four months from the beginning of his attack he became depressed, and then he never spoke, looked dull and heavy, slept well, and got fat, but his bowels became very costive. All his brightness and curiosity and much of his intelligence left him. He took no interest in anything. There was much of stupor in his state. He felt little mental pain. After about two months he got over his dulness, and became practically sane, cheerful, chatty, and contented. After three months of this condition, or about nine months from the beginning of the attack, he gradually got exalted, and passed through exactly the same phases as before. One never gets pure mental exaltation so well as in a good case of alternating insanity. The excitement lasted about six months, from March to December, being very mild for the last three months; he then passed into a two-months' attack of stupid depression as before, and was fourteen months well, his whole circle thus taking twenty-two months to complete. He then got exalted in December, and was acutely excited for about three weeks only, and then had an

attack of extreme stupor, depression, weakness, and prostration for three months. He got sane; at once almost passed into another attack of excitement. The whole duration of this circle was only four months. The excitement that followed was more acute than he had ever had before, and it lasted five months, and was followed at once by great depression lasting for six months. He was then sane for three months, this circle taking fourteen months to complete. This time he became exalted in May, and Mr Geoghegan, the Assistant-Physician in charge, thus describes him:—"Mr D. C. is abnormally excited and emotional. When in good humour he is ridiculously polite, tells the most pointless story over and over and over again, laughs louder and harder at it each time it is told, till the tears run down his cheeks and he has to hold on to some object to prevent him from falling, and his listeners, by pure contagion, are in much the same condition. At other times his conversation is absurdly religious, and he overdoes the part of a sanctimonious revivalist; and if his hearers show any want of gravity—a hard thing to avoid—he gets passionately indignant, and after a storm of displeasure goes off in high dudgeon. He can never bear contradiction or difference of opinion without anger." This circle took twenty-one months to complete. In December he became exalted again, his irritability being very great this time, and his hilarious happiness less marked. He remained so for nine months, and became depressed rather suddenly, passing into a condition of almost complete stupor, and leading an almost vegetative life. He remained so for almost five weeks, and then, without the usual intermediate period of sanity, at once one night became delirious, with hallucinations of sight, but this only lasted for one day. He was then four days depressed, and again got exalted, with more decided delusions than he had ever had before. This lasted less than two months, and he then took an attack of stupor again. By this time he was 82 years of age, and he had an epithelioma of one of his great toes, with irritation and suppuration, which acted as a drain and an irritant. This toe was amputated by Mr Bell, and he made a good recovery and has gained in flesh and strength, but has remained in the condition of depressed partial stupor ever since for two years, lying in bed mostly. He will answer questions when spoken to, but never ventures a remark or takes any notice of anything. He is in a state of complete senility and mental torpor.

In this case, as in all the others that I have seen with prolonged alternations, they were irregular, but in him the periods of excitement always began in cold weather, from October to February. The most striking circumstance about the case is its commencement at 74, after the intensity of the sexual period of life was past. It is, I think, only the second case of that kind I have known. Then the excitement coming on in spurts for a few days at the last, as if the senile brain had no longer vigour enough to get exalted,

would seem to be the natural ending of alternating insanity, whether it terminates in mild or complete senility.

In the following case of D. B. the attacks of excitement and those of depression ceased at the age of 65, after alternations of the two had lasted for twenty years. He was an artist, and could only paint at the beginning of the period of exaltation and at the end of it. He never could finish a picture, and if he attempted to do so he got worse mentally. So long as painting was spontaneous or pleasurable he did it, and it did him no harm. If he could not catch a likeness, or tried to elaborate or paint in details, or had nothing but drudgery to do, he got worse. In his case there was most marked exaltation of the memory, and his delusions always took the pleasant form of a loss of his own personal identity and the assumption of that of the author whose works he was reading or repeating. As he got better he would tell me that he was very happy indeed as he lay awake at nights, for he would fancy he was Shakespeare, Burns, or King David, as he repeated aloud their works. He could vividly recall the events of his boyhood, and repeat long conversations he had held with his friends then. His eyesight and hearing became very acute, so that he could read small print, and paint without spectacles, and hear whispers; while as the exaltation wore off he had to use stronger and stronger spectacles and was very deaf. When depressed, all his bodily functions, appetites, and propensities were torpid and sluggish. There was a difference of 2°·2 between his average temperature during exaltation and depression. I had in the case-books of the Carlisle Asylum a careful record of his condition from 1862 till his death in 1876. This shows the irregularity in the periods of alternation which characterizes most of the cases. Æt. 54, 1862, January, exalted; July, pretty well: 1863, July, quite well; October, depressed: 1864, February, exalted; July, depressed; October, quite well: 1865, April, depressed; August, exalted: 1866, January, quite well, and remained so till 1867, when in July he got depressed, and in December his alternations were diurnal, he being one day depressed and the next most excited, this lasting for a month or two: 1868, July, became depressed; October, quite well: 1869, April, depressed, and was so till October, when, instead of the usual and expected exaltation, he got quite well, and kept so for over three years, till January 1873, when he had a short attack of mild exaltation, lasting for three months. He then kept well till January 1874, when he had a few occasional days of slight excitement at irregular intervals, and then got quite calm and rational, though not energetic—in fact, he got into the typical and normal senile condition of mind and body, his brain remaining in this quiet haven of rest, after its twenty years of violent alternations of storm and sluggishness, till he died of bronchitis in the end of 1876, at 68. In this case it will be observed that there was a distinct tendency for the periods of

exaltation to occur in the early part of the year, in January and February, and the periods of depression to come on towards the end of the year, from October to December. The periods of depression did not follow, but precede, the exaltation in the case, contrary to the usual experience. One should rather say that the excitement followed and seemed to be a reaction from the depression.

The following dates of the admission and discharge of D. I. show the length of the attacks in his case, for he is sent to the Asylum whenever he gets exalted, and is sent home when the excitement passes off. He is then not very painfully depressed, quiet, penurious, and unsocial, sluggish for two or three months, and then gets quite sane and does his business very well. His exaltation is of the typical kind, talkative. energetic, passionate, quarrelsome, abusive, restless, sleepless, but never incoherent, and very fond of spending his money lavishly. He once got off to London about the beginning of an attack with £1000 in his pocket, with the deliberate intention to spend it in a month and enjoy himself, as he had "led too quiet a life at home," and he pretty nearly got through it. I have reason to believe that he once made a large sum of money during one of his exalted brilliant periods, just as he was passing into the elevated part of a morbid mental circle. Hopefulness, superabundant energy, mental subtility, argumentativeness, wildness, not offensive eroticism, but with a strong leaning towards the other sex, characterize this period. The dates show the irregularity of the seasons at which the attacks came on, and of their duration. He was 45 when first admitted, and had had a few attacks previously. Admitted October 1866, discharged January 1867; admitted April 1870, discharged May 1870; admitted August 1871, discharged September 1871; admitted December 1872, discharged February 1873; admitted February 1875, discharged May 1875; admitted August 1877, discharged September 1877; admitted November 1880, discharged January 1881; admitted December 1881, discharged March 1882.

An examination of the exact periods during which the exaltation, depression, and sanity persist, and their relation to each other during different recurrences, the sizes and regularity of the successive circles in each case, shows this far more than I had supposed previously to very exact investigation, viz., that the periods are not always the same in the same case at different times, and that, in fact, very few of them are regular and typical in their symptoms. I only find about one or two out of forty cases of *folie circulaire* were absolutely regular. In others the periods of excitement were often twice as long in one circle as in another, and the periods of depression and sanity varied also. The age, state of the general health, conditions of life, critical periods, diet, medicines such as a combination of the bromides and Indian hemp, have all the power of modifying

the length and the intensity of the periods of exaltation particularly. We shall see how important those facts are, taken in conjunction with the views as to the essential nature of those alternations which I am to speak of. While a typical case of alternating insanity is not hopeful, yet for prognosis we must not conclude that a case is incurable merely because there are recurrences and alternations for a few months or for a year, or even for two or three years.

It is very interesting and most important to study minutely the exact psychological differences in the same brain when morbidly elevated, and depressed, and sane; and it is almost equally important to compare the differences in the bodily symptoms of the two former conditions. The cases I have recorded show many of these differences and symptoms. In the elevated stage, either at the beginning or all through it, there is an actual exaltation of many of the mental faculties, notably memory, general acuteness and ability to reason in a way; the mentalization is almost unceasing in some form. The "common sense" is gone; the power of self-control and of undertaking definite mental work is gone; the power of attention, while it may be very acute in some ways, is not under the control of volition; there is a childishness of mental condition in some respects, a foolish credulity, and affectively the patient, though he feels morbidly happy, yet his emotions are always shallow and directed in fits and starts towards objects and persons that are present, and they are always weakened towards or withdrawn from their natural objects, wife, children, etc. There is a most remarkable change in the appetites, which are usually quite perverted from what was natural to the patient. Different kinds of food, drink, and stimulants are sought for and enjoyed. The general feeling of *bien-être* is exaggerated. The courage is exaggerated, and there is little timidity left. There is an intense desire to attract attention. There are always extravagance and morbid generosity. The social instincts are enlarged, lowered in tone, and they become somewhat promiscuous, a man nearly always seeking his social inferiors.

In the stage of depression the natural affections towards children, etc., usually return or flow into their natural channels with much force, but the subjective feeling of the patient is one of misery and illbeing: he has no courage, no power to resolve, no general activity of mind. In all the typical cases there is a sort of torpor and inactivity of mind; there is niggardliness in money spending, wearing clothes, etc. There is often a feeling of profound disgust and regret at the extravagant, foolish acts of the excited period.

The changes in the bodily symptoms are very marked. The patient, when exalted, loses weight; when depressed he gains weight during the acme of the period—the difference in weight between the two periods being often two stones. When excited he takes much exercise, and is restless and never tires. When depressed he is sluggish, and dislikes exercise, and is soon tired. In the former stage his temperature is above the normal, especially

in the evening; in the latter below it, the average difference being 1°·1, and in some individual cases 3°·6. In the former he can bear cold well and likes it; in the latter he cannot bear cold, and dislikes it much. In the former his bowels are mostly regular, and often moved more than once a day; in the latter they are costive. In the former his face is mobile and expressive and his eyes glistening; in the latter they are heavy. In the former he is always hungry, and his capacity for eating and digesting everything almost unlimited; in the latter he may eat well, but is very particular as to food. In the former he craves stimulants, tobacco, etc.; in the latter he often loathes them. In the former he is not sensitive to disagreeable odours, sounds, and sights; in the latter he is usually hypersensitive. In the former the skin is moist and perspiring; in the latter it is usually dry and often hard, and skin diseases, such as psoriasis, not unfrequently appear. While exalted the patient's pulse is usually full and hard; while depressed, small and compressible. In the former the sexual appetites and capacity are always increased; in the latter they are often paralyzed. (One gentleman told me that for two years he had no sexual feeling or power.) The sight and hearing are often much more acute in the former than in the latter. In the former state the patient sleeps little and lightly; in the latter long and soundly.

Many ordinary nervous symptoms follow the periodicity of the mental. I had one woman whose circle took about six weeks to complete, and whose period of elevation was always preceded and ushered in by severe cephalalgia and then by vomiting. I have had several women in whom the depressed period was preceded by neuralgia. Several of my patients can tell beforehand when they are going to get excited, by their bodily feelings.

I have for a long time been impressed with the relationship of the mental and bodily alternations and periodicity in insanity to the great physiological alternations and periodicities, and I have gradually been led to the conclusion that they are the same in all essential respects, and only differ in degrees of intensity or duration. By far the majority of the cases in women follow the law of the menstrual and sexual periodicity; the majority of the cases in men follow the law of the more irregular periodicity of the *nisus generativus* in that sex. Many of the cases in both sexes follow the seasonal periodicity, which perhaps in man is merely a reversion to the seasonal generative activities of the majority of the lower animals.

A careful clinical study of mental diseases reveals the fact that there exists in by far the majority of all the acute cases, at some time or other, in some form or degree, in the course of the disease, a tendency to alternation, periodicity of symptoms, remissions, or recurring relapses. Till I went minutely into this question I had no idea to what an extent this existed. I have taken the 338

cases of mental disease admitted to Morningside Asylum in 1881,—181 of them being cases of mania, and 129 of melancholia, the rest being general paralysis, dementia, etc.,—and I find that in 81 of the female cases, or 46 per cent. in that sex, and in 67 of the men, or 40 per cent. of that sex, there was relapse, alternation, or periodicity of symptoms in the course of their diseases. Many of the 338 admissions were chronic on admission, so that of the recent cases the decided majority showed those symptoms. 50 of the 129 cases of melancholia, or 39 per cent., and 98 of the 181 cases of mania, or 54 per cent., were alternating or relapsing, or showed diurnal, or monthly, or seasonal, or sexual periodicity. It may therefore be concluded that insanity in the female sex has more of this character than in men, and that the cases of mania have it to a greater degree than those of melancholia. In some cases it was a morning aggravation and evening improvement, those being usually cases of melancholia; in a few it was an evening aggravation, those being, contradictorily, also cases of melancholia. Very many cases of mania were more exalted one day and less so the next; many sleeping and waking on alternate nights, these being usually cases of mania. The attendants are very strong on this point of the "good" and "bad days" of these patients, and calculate much on them. Many of the cases had remissions and relapses of a few days for a time regularly. Some had monthly or menstrual aggravations. In some cases these periodic remissions occurred most at the beginning of the attack, but in far more cases towards the end of it, and during the convalescence of the patient. I had a lady lately under my care, convalescing from acute mania—E. K., a strong, healthy woman of 38. [She had recently recovered from a bad attack of rheumatic arthritis.] First attack, duration 10 days. Heredity to insanity. She remained in a state of acute excitement for about a week after admission, getting, however, at intervals sufficient sleep and sufficient nourishment. An abatement of the disease then set in, and from that period there was a slow but steady improvement until seven weeks after admission, when she was discharged, having made an excellent recovery. The most striking feature in the case, during the latter weeks of its course, was the distinct daily morning exacerbation and evening remission. Each morning showed a distinct improvement on the previous morning, but a distinct relapse as compared with the previous evening, while each evening she appeared to be further on the road to recovery than she was the evening before. In the morning she would be full of doubts, suspicions, and querulousness, while the evening would find her sensible, cheerful, and grateful. The change would come on in a few minutes without external cause. Even when convalescence was well advanced, the morning was for her a period of disgust and distrust, but with the evening came quiet, rest, and a thankful heart.

Such a case is merely a type of what is most common during all forms of mental disease, and especially during convalescence. A medical man in attendance should always prepare the minds of relatives for this tendency to relapse and alternate. Nothing is more discouraging to both the doctor and the relations, when it persists for a long time; but it is our duty to keep up their hopes and ours, and to think of and refer to examples where the tendency has been quite got over, even after a long time. I once had a young man of 20 who took regular relapses for five years, and after that made an admirable recovery, and to my own knowledge has done his work well and has kept well for ten years. Taking the chronic incurable cases now in the Asylum, I find that about forty per cent. of them are subject to aggravations of their diseases at times.

I find that the younger the patient the greater is the tendency to periodic remission and relapse. The phenomenon finds its acme in the cases of pubescent and adolescent insanity.

I also find that the stronger the heredity the greater the tendency to periodic relapses and alternations. I have never met with a single case that could be called typical *folie circulaire* where there was not hereditary predisposition to insanity. It seems as if there were certain brains so constituted as to be incapable of energizing, except irregularly swinging between elevation and depression, like a bad electric light. The above facts and statistics refer to ordinary remissions; but the infrequency of cases with such regular and continuous alternations as to be properly called *folie circulaire* may be seen from the fact that out of 800 patients in the Asylum at Morningside now there are only 16 of this kind, or two per cent., and of the last 3000 new admissions, comprising about 2000 fresh cases of insanity, less than 10 have as yet turned out of this character. But of course I do not include the cases with merely long remissions, or the cases with relapses for the first year or two, or the demented cases with occasional spurts of excitement, or the women with a few irritable days at menstruation, though many of these are of the same essential nature as the most typical cases of *folie circulaire*, following the same laws of perverted physiological periodicity in an irregular way.

I have had under my care that I can recall altogether about forty cases of typical *folie circulaire*. Of these about one-half followed a more or less regular monthly periodicity. About one-third obeyed the law of seasonal periodicity, all in an irregular way; and the remaining sixth I could bring under no known law on account of their irregularity. I have one extraordinary case, a lady, now, who was for a year deeply depressed, then for several years quite well, then for seven years more deeply depressed, then for three months passed for sane, but was really mildly exalted, then was depressed for a year, and has now been exalted, with all the typical symptoms of typical *folie circulaire*, for two years.

Commencement of the Alternating Tendency.—Though there are a few cases that begin with attacks of melancholia, yet in my experience at least 90 per cent. begin with attacks of maniacal exaltation. The ages of the patients on the first breaking out of the disease were all the way from 15 to 74, but every one, except the one, D. C. (p. 131), began within the actively sexual and procreative period of life. I find no record of a woman beginning after the climacteric period.

Termination of Typical Folie Circulaire.—As this cannot be accurately determined till after the patients have died, it is impossible for me to give accurate figures, but, of forty cases, five ceased to be subject to alternation in old age after 60, one being after 80, two being women, and the men all left in a condition of mind and brain that might be legally reckoned sanity, though in all cases there was some mental enfeeblement and a tendency to be easily upset, lethargy, and want of spontaneity and volitional power. I had another case that terminated in complete dementia. Two died of exhaustion during a maniacal period. Three things are sure about the prognosis—1. Its utter uncertainty; 2. Recovery cannot be looked for at the climacteric period in many cases; 3. About 20 per cent. may be expected to settle down into a sort of quiet, comfortable, slightly enfeebled condition in the senile period of life. In my experience very few indeed become completely demented, though two have run on into chronic mania. The tendency to death is very slight.

General Conclusions.—Looking at all those facts and considerations, therefore, I come to the conclusions that periodicity and a tendency to alternations of elevation and depression is an almost universal characteristic of mental diseases, that it is much more marked where they are very hereditary than in any other cases, that it is more common in youth, puberty, and adolescence, that it is in its essential nature merely the exaggerated or perverted physiological diurnal, menstrual, sexual, or seasonal periodicities of the healthy brain, and that the cases that have been called *folie circulaire* are merely typical or exaggerated or more continuous examples of that universal tendency to which I have referred. Another very remarkable fact about the typical form of alternating insanity is that by far the greater number of persons who suffered from it were persons of education, and far more than a due proportion of them were persons of old families. I never met with a fine case in a person whose own brain and whose ancestors' brains had been uneducated. It seems to me that the tendency to alternation of mental condition, to energize at one time with morbid hurry and then with morbid slackness, is one of the forms of brain instability which specially results from too much "pureness of blood," from the heredity of many generations of gentlefolks, all of whose brains had been more or less educated. Probably it is one of the modes by which nature brings that

kind of bad stock to an end, that has become bad by over brain-cultivation for many generations. There is remarkably little tendency towards dementia in the typical cases. D. D. has done fair literary work, in the intervals of his attacks, for the twenty-six years he has been ill. I have no doubt that it was the sexual and menstrual periodicity of mental diseases seen in so many cases that formerly originated the absurd idea that they depended on the moon's changes, and gave them the now common name of "lunacy."

Treatment.—The great point in treatment is to prevent the brain getting into the vicious circle of continuous alternation by endeavouring really to complete the cure in all cases of mania—especially in all cases of adolescent mania—and by prolonged quiet and rest after attacks in persons who have shown a tendency towards recurrence and relapse. In them particularly the whole organism should be kept up to physiological perfection. I believe that a non-stimulating farinaceous vegetable diet and no alcohol is the best for them, with an outdoor life and plenty of muscular exercise. A regular mode of life, too, without excitement, is best. One thing which I have heard recommended, and which is very apt to be resorted to in the beginning of the exalted stage when the patient is very erotic, is marriage, but I have never seen any good come of it either by cure or prophylaxis. I once, with Dr Heron Watson, had to stop the banns in the case of a lady who had been seduced and was going to be married for her money by a scoundrel who had got into her favour at the beginning of an attack. I mentioned the case of D. A., who usually proposed to many ladies at the beginning of his exalted attacks. There is only one class of medicines that I know which have the power of stopping and cutting short attacks, and of sometimes averting them for a long time, and these are the bromides, especially combined at the more acute stages with Indian hemp. The following three cases illustrate this action:—

D. F., æt. 23. This young woman has had six attacks of mania in four years. She had been insane for four weeks previous to admission. All the attacks had begun during menstruation, and while maniacal she was always very erotic, especially at the beginning of the excitement. She was violent, incoherent, noisy, dirty in her habits, and sleepless before admission and for about three months afterwards. She then got well, but in six months had another similar attack of mania, lasting for two months. She lost twenty-eight pounds in weight during this attack, and her temperature was always 1°·5 above its normal rate when she was excited. She remained free from excitement for nine months, and then had another similar attack. After four months of sanity she one night suddenly got up, smashed the windows of her dormitory, saying that the devil was looking in, and became violently excited, her temperature that day being 100°·8, pulse 108 and strong. She

was ordered drachm doses of the bromide every three hours, with a drachm of ammoniated tincture of valerian with each dose. She was put into a dark room at her own suggestion. On the following day her temperature was 99°·6, and her pulse 108. She was still much excited, but not so much so as on the day before. On the second day her temperature was 99°·3, and her pulse 130 and weak, the excitement being much allayed. The medicine was after this given only three times a day. She was left in bed for a fortnight in a dark room, as she said that if she got up she would get worse. At the end of that time she was still rambling, partially incoherent, and full of delusions, but nearly free from active excitement, and the medicine was discontinued. She remained slightly affected in mind for another fortnight. At the end of a month from the day the excitement began she was well, and was discharged from the Asylum six months thereafter. I heard a few weeks ago that she was still keeping well, and it is now a year from the time her attack of mania was thus cut short (as it seems to me) by bromide of potassium. I gave the valerian because she was beginning to menstruate at the time the mania began.

It will be observed that the excitement in this attack only lasted about three days, and she had never been less than two months excited at a time in her nine previous attacks. The aberration of mind was only of a month's duration. It had never been less than between three and four months previously, every symptom of an ordinary attack being clearly present at first; and the interval of sanity has been even now longer than any such interval except that between the fifth and six attacks. The excitement disappeared as the patient showed signs of coming under the influence of the bromide and its constitutional symptoms were developed.

D. G., æt. 56, a woman who has been rather weak-minded from birth, but got married and had children. She has been subject to attacks of excitement at intervals of a year or two for twenty years.

On her admission from another asylum she was found to be a little, thin woman, who went on talking quite incoherently, was restless and destructive to her dress, and violent at times. Sometimes she refused her food, and had to be fed with the stomach-pump. Though she got much food and stimulants, she became quite run down, thin, and exhausted in mind and body before the attack was over. The first attack lasted from March till the following January; she had a short attack in April. In the beginning of the next year she had another short attack, and in the December following she had three epileptic fits (the first she ever had). They were the prelude to an attack of excitement which lasted for six months. In the following year she had another attack of excitement lasting for three months. In the beginning of this year she again became excited, and was put on drachm doses of bromide and tincture of Indian hemp, three times a day at first, and afterwards

morning and evening. The medicine so completely moderated all the unpleasant symptoms of the excitement that she was kept in the infirmary ward among the sick patients. She was not noisy, destructive, and dirty in her habits, as she had been before; she did not lose flesh to nearly the same extent as before; she took her food better than ever she had done before during excitement; and the attack terminated in September, leaving her far stronger than she had ever been before after a long attack of excitement.

This case illustrates the effect of the medicine on an old person very weak in body, and perhaps, therefore, more amenable to the effects of the drug. Such cases, when violently excited in asylums, are far worse to manage and cause far more anxiety than stronger patients, and therefore it is more important to have a mild and safe sedative.

Another case is that of an old woman who has taken periodic attacks of mania for at least twenty years, and has been so much better during her last attack, under the use of drachm doses of the bromide and tincture of cannabis morning and evening, that she has been kept in the infirmary ward of the Asylum during the nine months the attack has lasted, and has, during that time, slept in a dormitory with other patients, has taken her food, and is now passing into the quiet stage of her disorder. In every attack which had occurred before she had been destructive, dirty, very noisy, and had to be all the time in the ward for the worst cases.

Pathology.—As regards the pathological appearances found after death in the cases of *folie circulaire* that died, I found in all of them more or less brain atrophy, especially affecting the convolutions, in all of them thickening of the membranes, in most of them vascular disease, with, in one or two cases, local disintegrations from embolisms and other causes of blood-starvation. In short, I found the common pathological appearances in cases of chronic insanity, with no special pathology whatever. That is what might be expected, for at the beginning the mental functions are so often quite restored between the attacks, that we can expect no marked pathological changes. The whole tendency to periodicity results, no doubt, from a mode of energizing, and not from structural change that can be seen after death.

Meeting VIII.—June 7, 1882.

Dr George W. Balfour, *President, in the Chair.*

The President said he felt sure the Society agreed with him in expressing deep regret at the death of their late President, Professor Spence. He was a man who was known, loved, and

respected throughout his professional career in this city. His case was an example of what could be done by hard work and an honest rectitude of purpose. He moved that a statement expressive of their loss should be engrossed in the minutes.

I. *Dr John Duncan* showed TWO BOYS on each of whom he had performed excision of both knees. One of them was operated on about two years ago. The other was done more recently. In both there was almost exactly the same condition—previous disease, resulting in bad fibrous anchylosis, the heels being drawn up towards the buttocks, so that they walked on hands and knees. In the case of the first done there was a slight tendency for the knees to become bent, but that was readily overcome by bandaging and rest in bed. There was also a curious outgrowth of new bone on the inner side of the right tibia. They both walked a little stiffly as yet.

II. *Dr Heron Watson* showed (1.) A BULLET with a portion of the alveolar ridge of the lower jaw. Four weeks ago he was asked to see a boy in Edinburgh, who, while crow-shooting in Peebles-shire, had been wounded by a ball which was said to have glanced off a tree. He found an aperture in the lower lip. The incisor teeth and alveolar ridge had disappeared. The finger passed in below the frænum of the tongue as far back as the hyoid bone, in the middle line. Here the course of the wound deviated to one side, so that the finger could be passed between the respiratory apparatus and the sterno-mastoid. On carrying the hand down the side of the neck there was emphysematous crackling along the line of the sterno-mastoid. As there was no evidence of the presence of the bullet, he thought it prudent to leave matters alone, and did so for eight days. During this time discharge escaped into the mouth. The wound became inflamed and the neck swollen. He therefore cut down along the line of the sterno-mastoid and into the track of the wound, and found the ball and alveolar edge to the outer side of the sheath of the vessels and in the muscle. The result was satisfactory—no sloughing nor any other trouble occurring. (2.) AN EPITHELIOMA OF THE TONGUE AND FLOOR OF THE MOUTH, removed from a patient the previous day. The disease was adherent to the bone, a considerable portion of which had in consequence to be sacrificed. The symphysis, the greater portion of both horizontal rami, and the whole of the tongue were removed. The thermo-cautery was used to separate the tongue from the hyoid bone and the soft parts around. [The patient has since made good recovery.] (3.) A PORTION OF THE LOWER JAW OF A YOUNG WOMAN, removed three weeks before for cystic disease. The cyst had been twice incised, and lint stuffed into the cavity to make it suppurate. When she came under his care the disease was in the region of the lower molar teeth. He incised. A greenish fluid escaped. The wisdom tooth was felt in

its place, but there was also felt an endocystic growth at the upper part of the cyst, which rendered the removal of the diseased portion necessary. (4.) A HYDROCELE SAC, which had been thrice tapped and injected, but had not diminished in size. He had therefore performed an operation for its removal, including the testicle with a large portion of the scrotal coverings. The sac showed that it had been undergoing partial calcification, and the effects of inflammatory action were to be seen here and there over its surface. Healing went on rapidly after its removal. (5.) A SPECIMEN OF FIMBRIATED SYNOVIAL MEMBRANE, removed from the knee-joint of a young lady. Tapping and pressure with the use of oleate of mercury had been tried without much effect. More recently the joint had become the seat of attacks of severe pain. An incision was made into the joint, laterally, on each side of the patella, the diseased synovial membrane laid hold of, and snipped off with a pair of curved, sharp-pointed scissors. Two drainage-tubes were inserted and antiseptic dressings applied. At the end of a week the parts were healed, an anterior splint adjusted to the limb, and the patient allowed to go to the country. She is now able absolutely to place the limb in a straight position, which before she was quite unable to do. It might be within the recollection of the Society that he showed over a year ago the results of a case where he had operated for a similar condition. He saw the patient getting into a railway carriage the other day in Fifeshire, and noticed that he moved about nimbly without the least appearance of lameness. He believed that this mode of treatment was quite original and novel, the opening of the knee-joint for the removal of loose cartilage being, of course, of a different nature altogether.

III. *Mr Joseph Bell* showed a SPECIMEN which he thought of interest in connexion with recent writings on traumatic malignancy. It was a round-celled sarcoma of an undescended testicle, removed from the person of a young gentleman æt. 23. There was only one testicle in the scrotum, and since he was five years of age the patient had a small lump in the left groin, which he was certain was his testicle. It gave him no trouble till six weeks previously, when in going up-stairs he stumbled, and a meerschaum pipe in his pocket injured the undescended testicle. It rapidly swelled, and was about the size of a goose egg when he consulted Mr Bell. There was no pain. After a consultation Mr Bell resolved to cut down on it and deal with it as might be found necessary. After exposing it, it felt so soft and fluid-like that, by Dr Duncan's advice, he inserted a trocar, but, as he expected, failed to get anything save a few drops of a bloody fluid. It was then removed and the ring stitched with catgut. The tumour, on section, was seen to be very diffluent. It had been examined by Dr Hamilton, who pronounced it a round-celled sarcoma. A rapid recovery has resulted.

IV. *Dr Craig* showed a RENAL CALCULUS passed by an old lady æt. 70. The specimen had a great many little sharp nodules on it, and caused so much pain on passing down, that of half-grain morphia suppositories (one ordered every two hours) she took five before obtaining relief.

V. *Dr Kirk Duncanson* showed (1.) a piece of a QUILL, one centimetre in length and five millimetres in diameter, which he had removed by forceps from the external auditory meatus of a hotel waiter, deaf in his left ear, and suffering from an attack of formicular abscesses in his right ear. To relieve the deafness arising from the closure of the meatus, the patient had cut a piece of a toothpick to the above size and inserted it to keep the walls of the meatus separate. The piece of quill slipped into the meatus beyond the swellings, and, after many futile as well as painful attempts to remove it, the patient came to the Ear Dispensary, 6 Cambridge Street. Syringing could not well bring it out, so he removed it, using the frontal mirror, a small speculum, on account of the painful swellings of the meatus, and an angular pair of fine alligator forceps, as shown. (2.) A BUTTON removed from the external meatus of a boy who had been brought to have a piece of necrosed bone, also shown, removed from the other ear. On examination the button was seen firmly impacted in the meatus. It could not be removed by syringing, but was removed by another classed form of the delicate angular alligator forceps, also shown. The button had caused ulceration and perforation of the membrane.

VI. *Mr Joseph Bell* read his paper entitled

CASE OF INTESTINAL OBSTRUCTION TREATED BY OPENING THE ABDOMEN.

IN Dec. 1881 I was asked to see E. S., æt. 16, a servant to an invalid lady, on account of vomiting and abdominal pain.

The symptoms had lasted for three days, had been supposed the result of indigestion, and had been treated by the administration of several pretty smart purgatives, salts, castor oil, etc., all with no result except the increase of the vomiting and pain.

The girl was well nourished, very quiet and patient, exhibited no symptoms of inflammation, pulse and temperature were both normal. Nothing was to be made out by abdominal manipulation except a small, deep-seated point of extra-resistance about $1\frac{1}{2}$ inches to right of mesial line of abdomen, just below level of umbilicus. There was no special tenderness there or in flanks.

Menstruation, always somewhat painful, was impending. I at once took a most unfavourable view of the case, fearing some obstruction; ordered solid opium in pill, a grain every fourth hour, no food except ice with an occasional teaspoonful of milk, and hot fomentations to the abdomen.

Next day the patient was much better; the vomiting had not returned, the pulse and temperature were normal, and the pain was almost gone. Menstruation had appeared. Still I was not satisfied, for the sense of resistance at point mentioned above was still to be made out, and with the exception of one or two slight indications of flatus, nothing had passed.

Enemata were now ordered, with the effect of clearing out the lower bowel, but no more. Next day vomiting had again commenced, and no improvement in other respects; so, as there were no facilities for nursing and treatment in the house, I sent her into the Infirmary, under the care of my colleague Dr Affleck.

He saw her at once, and agreed in the diagnosis as being almost a certainty. Still the symptoms were so little marked, and the constitution was so little affected, pulse and temperature remaining normal, that two days more were allowed to pass, treating the case by injections of oil per anum, and bismuth and opium by mouth. Galvanism was also fairly tried.

On Friday, 30th Dec., with Dr Affleck's approval, the following operation was performed, with antiseptic precautions:—An incision about 3½ inches in length was made in middle line between umbilicus and pubes; the bleeding points were secured by torsion and Pean's forceps. The peritoneum was easily recognised and opened, and just below the navel a coil of intestine was found reddened, swollen, and already coated with lymph. This I cautiously drew down out of the wound, and found, first, that a sharp turn or twist was interrupting its lumen. This easily untwisted, as being due, probably, to the inflammation only. I next came on an intussusception extending to about 4 inches. It was by no means firmly impacted, non-adherent, and was easily reduced; it probably was due to the inverted peristaltic action. Still the coils showed evidence of further complication, so, passing my hand downwards to right iliac region, I easily recognised what must have been the initial mischief, namely, a tight round band, 1½ inches in length, passing from one coil of intestine to another, and thus forming a loop or noose, into which another coil had passed when empty, had become filled, and then could not return. This loop I divided easily enough, and secured the bleeding end with a catgut ligature.

After clearing out the peritoneum, and seeing that no hæmorrhage was going on, I then stitched up the wound in usual manner, with the usual dressings. The patient expressed herself as much relieved from pain on coming out of the chloroform narcosis, but towards evening her strength failed, limbs became cold, and she survived the operation little more than twelve hours.

This case was interesting as being one in which the diagnosis was completely verified, and I cannot help thinking that had we operated sooner the fatal issue might possibly have been averted.

The President said the case was not one of every-day occurrence. He could not help thinking that, though unsuccessful, it had been carefully and well treated, and the fatal issue could in no way be blamed upon the surgeon.

Dr Watson thought the Society was much obliged to Mr Bell for bringing this case before them. In connexion with these cases a good deal more interesting and valuable information might be got if surgeons remembered that it was not successful cases alone that should be published. The misfortune was that in reporting they were all too apt to consider the success, and not the lessons that were to be learned from the history and progress of a case, whether it was successful or not. If such cases were more frequently recorded, a foundation might be formed on which we might construct materials that would enable us to come to a more definite diagnosis of the various causes of obstruction than we could pretend to do now. He thought there was little doubt that had an operation been performed in this case before inflammatory action had set in, the success would have been greater.

Dr Duncan did not know that he had any special confession to make in regard to what Dr Watson had said about not reporting cases. He had operated, he thought, in all five times for ileus. Once the operation was successful, on the other occasions it was not. The cases that seemed to him of most interest were those in which his diagnosis was utterly wrong. One was a patient of Dr Bruce's who had been running about at school up to a day or two before the symptoms of severe obstruction appeared. He thought it was a case of internal hernia with a greater amount of tympanites than usual. The abdomen was opened, and presented an appearance quite appalling. It was all one mass of lymph, the disease being tubercular peritonitis with a fresh acute peritonitis. A loop of bowel was found strangulated or caught by a knot. It was relaxed, and wind rushed down, but the patient died. Another case was equally striking. It occurred in the practice of Dr Balfour of Portobello, who asked Dr Duncan to see it. The patient was a woman who had suffered from an acute obstruction a year before, which had been relieved by opium and belladonna. A second attack came on. He cut down on it, but instead of finding the internal hernia he expected, he found a small and hard sarcoma of the ascending colon. The obstruction occurred there. He cut away a portion of the bowel and made an artificial anus in front, but the patient died two or three days after. These were cases in which, on looking back on them, he did not think that even now he could diagnose from internal hernia.

Dr Affleck had much pleasure in hearing Mr Bell's paper, and confirming what he said. He did not know till he came to the Society that it was this particular case that Mr Bell meant to bring before them. He recollected it well. It was one of great anxiety. Their great difficulty was as to the diagnosis—the coming

to a conclusion as to the exact nature of the lesion. In all cases of obstruction he thought that, unless the evidence was in favour of hernia or intussusception, the medicinal remedies should be tried first. This was done in the present case. Galvanism and rubbing of the abdomen were among the remedies. The difficulty in all these cases was the diagnosis, and he thought the subject was one deserving of more discussion.

Mr Bell said that what he wished to bring out was that the lesson he learned from this case was the necessity of not trusting too much to the constitutional symptoms, and of operating early. The symptoms were very mild. He was then against operating too soon; but if he got a similar case now, even though the symptoms were much milder, he would operate at once.

VII. *Dr Duncan* read his paper entitled

ON THE TREATMENT OF FRESH WOUNDS.

I SUPPOSE that as the recipient of discharge, as a protection from external irritants, as a means of retaining parts in contact, or for other reasons, some form of dressing is required in the treatment of wounds. The ideal surgical dressing is one which, while effectually meeting these ends, requires no interference until the wound is healed. If and when this can be attained, the rapidity of healing will be determined simply by the vigour of the individual, and pain and anxiety will be absent from patient and surgeon.

Many attempts have been made to attain this end. Mr Lister's methods keep it in view; M. Guerin has aimed at it in his cotton-wool dressing; and Mr Gamgee has strongly supported a similar treatment. I have recently made some experiments in the same direction, using the salicylized wool introduced by Professor Thiersch.

Three obstacles to a permanent dressing present themselves. These are the sutures, the drainage, and the antiseptics.

A wound cannot heal quickly unless the contact of its surfaces be reasonably close. The more accurately the edges are approximated, the more certain are they thus to heal. This accurate apposition can only be brought about by sutures. To attain, then, the object which we have in view it is first of all necessary to have sutures which can be absorbed by the tissues, and we find our wants to a great extent met by carbolized catgut. But the chief difficulty in the use of sutures undoubtedly lies in the tension to which they subject the textures. If the tissues are perfectly lax, and union by the first intention take place, the new material which unites them is sufficiently strong in three or four days to resist the normal elasticity of the cutaneous envelope. In such cases a fine catgut would last for the necessary time. But inasmuch as, from exudations of blood or

serum, or from other circumstances, either the union may be somewhat delayed or the tension somewhat greater, it is well that the catgut be of such a quality and thickness as to secure it from absorption for seven or eight days. More than that is unnecessary. It is a mistake to suppose that the use of a permanent material, as wire, silk, or horse-hair, enables you to resist tension. The fact is that if a wound be perfectly lax, sutures are of use only in maintaining steadiness, while, on the other hand, if the tension is such that the wound requires support against it after the first week, any ordinary suture which may have been left in will have cut its way through the skin, and, so far from doing good, will add to what inflammatory action may be present.

There are cases in which, from deficiency of skin or from other causes, we must be prepared to encounter much tension, and I believe that under healthy and aseptic conditions we may attain union of any surface which we can bring into apposition by manual pressure, and which can be so maintained without cutting off its blood supply. But in such circumstances we must distribute the pressure and take it off the margin of the wound by buttons or quills, being careful so to apply them as to get the maximum of relaxation at the edge with the minimum of pressure on any one point. It is not in virtue of the permanent nature of the material, but because of the distribution of pressure, that we meet with our success. Even thus tension is not entirely evaded. These sutures are not without their disadvantages. The material which unites the buttons tends, of course, to pass from one to the other by the shortest route, and in doing so produces ulceration, which is none the less real because it is not always visible on the surface. In septic wounds it is frequent, and in aseptic it occurs that suppuration forms in the track of such sutures, and, if it do so, is apt to be dammed back by the button. They ought, therefore, to be taken out as soon as possible. Of them, also, it may be said that in most cases they have fulfilled their mission in ten days; and unless the tension be very great indeed, and the union very sluggish, I find they may be safely removed in that time.

Plainly, then, catgut, especially if chromicized, may be used to unite the buttons instead of silver wire. When it is absorbed the buttons will lie harmlessly under the dressings, in simple contact with the skin. I have used this means of buttoning in cases where the tension was really considerable, and with admirable effect; but I have not yet ventured to discard wire when much force was required. I have, in short, long given up every suture but catgut for the edges of a wound, and only occasionally use the silver wire and buttons for relaxation.

If, then, we can get a dressing which otherwise we may leave on indefinitely, there is little impediment in the sutures. In most cases catgut may be used, and in the others a renewal of the dressing

at the end of a fortnight will allow of their removal. This limitation, however, there is from the side of the suture.

Drainage is in many respects an admirable invention, and in some aspects the recognition of the principle it involves is one of the most marked improvements of modern surgery. But I have no doubt whatever that it may be carried too far. In suppurating and septic wounds it may easily become a source of irritation. As a rule, in these cases, if a drainage-tube have not fulfilled its purpose in a week, the meaning is that it is badly placed or insufficient, and in any case that a new departure must be made.

In fresh wounds, again, it is evident that if we can approximate the condition to that of a bruise we have little need for drainage. No one would think for a moment of converting a simple into a compound fracture merely with the object of evacuating the blood and relieving tension. The tension and extravasation of blood are often very extensive after severe contusion, but we await absorption with the most perfect confidence, certain that suppuration will not occur unless the conditions of constitutional health or local destruction of tissue be highly unfavourable. Now, after an injury inflicted by the surgeon, although in many cases the constitutional state may be bad, the local injury ought to be more favourable than in a severe bruise. The tissues are sharply cut and perfectly viable, and the vessels are tied so carefully that serious distention should not occur. If, then, there were no other intercurrent circumstance, drainage ought to be unnecessary. But by almost universal concurrence of opinion it is held to be necessary. The reason is to be found in the admission of air and its contents. It is because the results of such admission are the conversion of the harmless fluids of a bruise into virulent and deadly poisons, which can only be prevented from producing their pyrogenous and phlogogenous effects by immediate evacuation. The most perfect examples of the character of these products are met with in abdominal surgery, and the most beautiful results of drainage are there also seen. The bloody serum to which Dr Marion Sims has recently been drawing attention is the source of the evil. But why? No one will pretend that a little bloody serum in the peritoneum would produce an evil effect unless there were a wound. It does not do it after an operation for strangulated hernia. It only does it in a few ovarian operations. Plainly because only in these few has it been poisoned from without. And the results are there rapidly fatal because the surface on which the poison exerts its phlogogenous action is so enormous and its means for entering the circulation so free.

Well, then, if the antiseptic theory be true and its practice moderately feasible, we have no need for drainage on this account. It is not necessary to drain the bloody serum, because the bloody serum is innocuous. But it is said that the irritation of antiseptics increases the flow of serum from the wound, and renders drainage

necessary to avoid tension. Practically I doubt the truth of this observation; at least the discharge is not of such amount or kind as to make any demand for special means of drainage in the majority of our cases. On the contrary, because it is serous it flows easily through the interstices between the sutures, and it is certain that its flow ceases in a very short time. I find that if a wound remain aseptic drainage tubing is rarely required.

I have come to this conclusion after trying all sorts of absorbable tubing, catgut, decalcified bone, and other forms. The catgut is unnecessary if the wound be aseptic, is inefficient if it suppurate. The others last too long if the wound goes on well, melt and soften in a few days in purulent discharge. A good example of the behaviour of Neuber's tubes was seen in an amputation of the ankle. It required no dressing after operating, until at the end of a fortnight I thought we might find it healed. It was so, but the large tube which had been inserted at one corner projected unaltered. I could not withdraw it, because its deeper part was firmly incorporated with the tissue. I pressed the soft parts back, cut the tube off short, and a week afterwards found it covered over. It had simply acted as an impediment to healing, and had been utterly useless from the first, for there was not a tablespoonful of dry blood in the dressings. Drainage, then, I regard as usually unnecessary in aseptic wounds in which the ligature of vessels has been properly performed, and in which the deep surfaces are kept in close contact so as to induce any slight ooze to pass outwards.

Undoubtedly if accumulation were to take place it would delay healing by keeping surfaces apart, although I do not find that in aseptic cases it tends to cause inflammation or raise the temperature. Still it is to be avoided, and there are wounds in which it is nearly certain to occur if special precautions be not taken. In these indiarubber or glass is the best material, but it ought to be removed as soon as possible, and a special dressing for the purpose is advisable on the night of operation or the following day.

There yet remain for consideration the influence of putrefaction and its prevention.

There are two methods whereby the evils of septicity may be avoided—to prevent the entrance of the germs of putrefaction, and to render the soil unsuitable for their multiplication. The first and most important involves all that minute attention to detail in cleanliness and the use of germicides which Mr Lister has so thoroughly established. His dressings fairly accomplish this object, and the results attained are admirable. But the second is scarcely less important. It is less important because, if the entrance of noxious influences be prevented, it would matter little what the nature of the soil might be. But undoubtedly germs creep in notwithstanding all precautions, and it is of great moment that they should find conditions unsuitable for their multiplication. I suppose, for example, that the chances of a wound becoming septic are

much greater in a diseased than in a healthy man, that the germicide properties of healthy tissues are much stronger than those of diseased textures; and it is certain that the results of septicity are much worse in the weakly than in the strong. This object, of course, involves the care of the patient's general condition. But the soil may also be rendered unsuitable for germination by means applied locally.

I have sometimes thought that perhaps we are too timid in our application of antiseptics to wounds. I have had exceedingly good results from carbolic irrigation. I excised the os calcis in a patient of Dr Sidey's whose wound, septic before, remained so after operation. The temperature rose alarmingly, and we thought the patient would die of septicæmia. Irrigation was established by three worsted threads, which led into the cavity continuously for a fortnight a stream of 1 to 40 carbolic lotion. Yet the patient suffered in no way from carbolic poisoning, while the symptoms of septicæmia disappeared, and healing went on steadily, though slowly. But whether or no highly septic discharges should in some instances thus be charged with an antiseptic, we have other methods of rendering a fresh wound unfavourable to the propagation of germs. Two of these seem to me specially important. Dryness is highly conducive to safe and rapid healing. Moist warmth favours all forms of decomposition, and promotes exudation. Careful arrest of hæmorrhage, and a covering at once dry and permeable, are therefore strongly indicated.

Again, accurately applied compression is an aid to quick union, because it brings together and keeps in immediate contact parts which may at once adhere, and which thus also come, as it were, within striking distance, and so exercise their germicide properties with success. Further, it helps to arrest the exudation of blood from the capillaries and smaller vessels, and prevents bagging of the wound.

Now the mode of dressing by gauze and mackintosh, while reliable for the exclusion of septic influences, is in these ways imperfect. It is an immense improvement on the old painful daily dressings. But it promotes moist warmth. It does not lend itself readily to equable compression. It cannot be used as a permanent dressing. It requires renewal weekly, because the antiseptic is in that time exhausted at the temperature of the body. Doubtless exhaustion of the antiseptic would do no harm unless the discharge were sufficient to reach the edge of the dressing. If you cover an aseptic fluid with a few layers of gauze or with a single layer of mackintosh, it will remain for any time and at any temperature untainted. But the mackintosh keeps the skin underneath it moist from perspiration, and even were there no discharge from the wound, putrefaction would occur so soon as the antiseptic was sufficiently exhausted.

Considerations such as I have endeavoured to explain, and many clinical attempts with this and that method, have gradually led me to adopt a style of dressing which enables me in a large

proportion of cases simply to lay the patient aside till his wound has healed. The method is as follows:—The wound is carefully and accurately stitched. If it be large, an interval of an inch or less is left between two of the stitches at some convenient part, and if, from the nature of the wound, firm compression throughout is uncertain, a few of the catgut ligatures are left long and brought out at the interval, or an indiarubber drainage-tube is inserted. In most cases it is completely closed. A piece of dextrinized oiled silk is applied. Mr Lister's object in this application is to protect from carbolic irritation; but were it not that it also prevents adhesion of the dressings, I should not consider it of importance when the edges of a wound are carefully approximated. One layer of moistened gauze is the next covering, and over it a thick padding of dry salicylic wool, firmly compressed by a gauze bandage. The layer of gauze facilitates the ultimate removal of the dressings. Without it the wool, irregularly hardened by the dried blood, forms a sort of cuirass and is apt to stick. I have tried silk instead of wool as a dry dressing. It does not, however, produce the same equal pressure throughout.

I have now used this dressing in a large number of cases, which I desire shortly to enumerate.

I. For long I have been in the habit of using a modification of the method in small wounds, whether produced by accident or by the surgeon. Having smeared them with carbolized oil, as the least irritating of antiseptic applications, and, if necessary, applied stitches, I seal them completely up with salicylic wool and flexile collodion. In cases too numerous to relate the healing has been perfect, and the failures extremely few. In large accidental wounds the dry dressing described is very successful. Thus, in two cases of immense scalp wound, and in one in which the belly of the supinator longus was completely torn across, only the one dressing was required. Septic matter, however, is apt to be introduced in such injuries. Thus, in a severe compound fracture opening into the elbow-joint, and in an extensive lacerated wound of the thigh, the dressing was abandoned for a time on account of suppuration, though both ultimately healed exceedingly well.

II. The following are examples of perfect healing in operations of a minor character. By perfect healing I mean that which occurs where there has been no rise of temperature, no pain, and no necessity for change of dressing till the wound is closed:—

a. Six amputations of the fingers for injury.

b. An amputation of the middle finger for whitlow in E. T., æt. 62, admitted 17th March, dismissed 8th April 1882. I mention this specially as a case in which septic inflammation extending far into the palm was successfully corrected by chloride of zinc.

c. Three cases of operation for strangulated hernia, viz., C. F., æt. 27, admitted 26th January; W. R., æt. 27, admitted 8th March; and C. G., æt. 84, admitted 14th March.

d. J. M'T., æt. 17, excision of sesamoid bone of great toe. Admitted 1st February.

e. C. L., æt. 27, admitted 20th June 1881. Excision of adenoid tumour of the mamma.

f. An interesting extension of the principles involved was made in the application of the method to the opening of abscesses where there is no persistent cause of pus formation, and where pressure can be accurately adjusted. Most of them were out-patients, but these may be mentioned as admitted to the house:—A. P., æt. 29, 11th March; abscess of the cord; found healed on the tenth day, the dressing not having been removed till that time; J. L., æt. 7, 11th January, large glandular abscess of neck; and E. F., 1st March, deep abscess of axilla, in whom the same success was attained.

g. J. B., æt. 38, admitted 30th March. The actual cautery was applied for ulceration of the cartilage in the knee-joint, with good effect so far as the joint was concerned. The wound was looked at simply from curiosity only twice, with intervals of fourteen and twenty-one days.

III. The following are examples of perfect healing after major operations:—

1. Mrs B., æt. 34, a patient of Dr Soutar of Golspie. The family history was most unfavourable, and she had tubercle in the apices of the lungs. Amputation of the forearm was performed for disease of the wrist. The incisions were made through healthy textures. The dressing was not removed for three weeks, when the wound was found perfectly healed, with only a little dried blood in the dressing.

2. J. C., æt. 19, admitted 14th June 1881. Syme's amputation at the ankle was performed for disease of the tarsus. The dressing was removed after a fortnight, as a matter of curiosity, not that it was required. A superficial abrasion at one corner alone remained. The dressing was renewed, and it was found healed in another week.

3. D. L., æt. 37, admitted 1st December 1881. In this case the patient was rapidly sinking from strumous disease of the right wrist, right ankle, and third toe of the left foot. The wrist and toe were treated, after amputation, by the method I have described, while the ankle was otherwise dressed. The amputation at the ankle was performed through putrid sinuses, the others through fresh surfaces. These last were healed absolutely when the dressing was taken off for the first time three weeks after operation. As sometimes occurs, however, the general health of the patient having become temporarily disordered, I think by continued discharge from the ankle, ulceration of the cicatrix to a slight extent occurred in both three or four weeks after they had healed.

4. R. S., æt. 18, admitted 20th March 1881. Syme's amputation

at the ankle. This case, already referred to as being delayed by Neuber's drainage-tube, was only dressed once at the end of a fortnight.

5. J. P., æt. 38. A patient of Dr T. Balfour. Excision of the mamma was performed for scirrhus. The wound was found absolutely healed when it was dressed after ten days.

6. G. B., æt. 15, admitted 1st February. Amputation at the upper third of the arm for injury. It had been caught between the rollers of a printing-machine. Examined in three weeks, it was found absolutely healed, with the exception of a surface about the size of a pea, where plainly a portion of bruised skin had sloughed. In another week that also had closed.

7. M. P., æt. 46, admitted 28th February 1882. Amputation at the wrist-joint was performed for gangrene of the hand from obstruction of the brachial artery. It was examined in fourteen days, because she felt "as if there were discharge in the dressing." There was none. It had all but healed, and was absolutely united when we saw it again in another fortnight.

8. A. B., æt. 16. Amputation of the foot for injury was performed by Syme's method, 19th November. The stump was dressed the same evening, and a drainage-tube which had been inserted was removed. It was not again looked at till the 21st day, when it was found healed.

9. Mrs E. W., æt. 46. Excision of the mamma for scirrhus was performed 12th May. It was dressed next day, on account of slight oozing through the dressing. It was found healed at next inspection on 26th May, and she went back to Shetland 30th May.

10. J. I., æt. 12. Excision of the lower end of the humerus on account of old dislocation was performed on 23rd May. A small indiarubber drainage-tube was inserted at the operation, but was removed next day. The wounds were absolutely sound at next inspection on 5th June.

But a method is to be judged as much by its failures as by its successes. I mention all my remaining cases in two classes—1st, those in which the success was not complete, but in which the patients made exceedingly good progress; 2nd, those in which, after trial, the method was abandoned.

I.

1. G. M'L., æt. 53, was admitted to the Infirmary 15th March 1882, suffering from extensive ulceration of the leg, for which I performed amputation below the knee. At the point of amputation all the tissues were much swollen and œdematous. It was necessary to change the salicylic wool five times in six days on account of the serous exudation having penetrated the dressing. It daily diminished in quantity, however, and the sixth dressing did not require removal for fourteen days, when the stump was found healed. There was no rise of temperature whatever.

2. Mrs M. W., æt. 36, had been treated in the Infirmary for many weeks on account of disease of the knee-joint, at first with promising results. Subsequently, however, it became evident that she was gradually sinking, partly from the discharge from the knee, partly from progressing phthisis. I accordingly amputated through the diseased tissue, where a sinus already existed, by Mr Spence's method. For ten days the dressings had to be changed every second day on account of the flow of bloody serum. After that the much longer intervals of ten days or more intervened, and the healing, though slow, was ultimately well accomplished. The temperature, which before the operation had been habitually as high as 101° each evening, never rose above 99° after the operation.

3. D. J., æt. 8, 13th March.—In this case I excised the knee-joint on account of progressive disease, and because it was fibrously anchylosed at right angles. The skin was unbroken at the time of operation, but we failed to maintain the parts aseptic. Nevertheless the dressing remained unchanged for a week, and only required reapplication at long intervals. There was some increase of temperature for three or four days, and pus was found in the dressings at each inspection. It has healed soundly, though slowly.

4. Mrs W., æt. 46.—Excision of the mamma for scirrhus was performed on 10th May. In this case so much skin had to be removed that buttons with catgut had to be used. Micrococci were found in the discharges, and the dressings required renewal five or six times, but it healed quickly, and temperature never rose above 99°·5.

II.

In the following cases the dressing was abandoned at various dates after operation:—

1. An amputation at the ankle for severe injury of the foot.
2. Amputation at the ankle by the lateral flap, consecutive to excision of the os calcis.
3. Excision of the wrist.
4. Operation for strangulated inguinal hernia.

In two of these cases, Nos. 2 and 3, we failed to correct the putrescence which existed in the tissues at the time of operation; in the other two, although the skin was unbroken, sepsis also occurred. All did well. Having ascertained the presence of bacteria, and observing that the parts were somewhat red and swollen, I introduced drainage-tubes and applied a boric poultice. In a period varying from a few days to a week these symptoms disappeared, and the dry dressing was resumed and continued, with long intervals between the renewals, until healing took place.

These cases constitute, as yet, all my experience of the method. If we include the strangulated hernia, the number of important operations was—

I. With perfect healing, 14, viz.,—
3 Herniotomy.
3 Amputations at ankle.
2 Amputations in forearm.
1 Amputation at wrist.
1 Amputation of upper arm.
3 Excision of mamma.
1 Excision of elbow.

II. With almost perfect healing, *i.e.*, in which dressings required renewal, although very rarely, and the general and local symptoms were absolutely good, 4, viz.,—
1 Amputation of thigh.
1 Excision of knee.
1 Amputation of leg.
1 Excision of mamma.

III. In which failure occurred, *i.e.*, the dressing was abandoned on account of inflammatory action, 4, viz.,—
1 Strangulated hernia.
1 Excision of wrist.
2 Amputation of ankle.

Three other major operations were since performed through pre-existent sinuses, and dressed in this manner. In one, in which asepsis was maintained, the dressing required renewal several times, though at long intervals, and it was continued throughout. In the other two putrefaction continued, and the dressing was temporarily abandoned.

The deductions I would draw from my observations are:—

I. That when we succeed in preventing sepsis at the operation we can by this method rely on singularly simple and favourable progress, with total absence of fever, with freedom from pain, and with great rapidity of healing. It is proper to be exceedingly careful in the arrestment of hæmorrhage; but even did a little reactionary oozing occur, it is only necessary to renew the dressing once, or, as I did in some of these cases, to put on an additional layer of wool.

II. That should sepsis lead to inflammatory action, it is necessary temporarily to abandon the dressing.

III. That even in septic cases it is often advantageous to continue it throughout if there be no inflammation, or recur to it when inflammation has subsided, because it is a good excipient for discharge, because it tends to diminish the amount of pus, and because it aids in keeping the part at rest.

IV. That in fresh wounds so situated that they can be firmly and equably compressed the introduction of materials to secure drainage is usually unnecessary, and that if the drainage-tubes be introduced they should be removed in twenty-four hours.

V. That sepsis is less apt to occur by this method, as it avoids the risks which attend changes of dressing and move-

ments of drainage-tubes, which, in my experience, are more fruitful sources of failure than even the original operation.

Dr Watson said the observations which had fallen from Dr Duncan were of extreme interest, both in themselves generally and to himself personally, because they corroborated the experience he had in dressings which were almost analogous to those from which Dr Duncan derived so much benefit. Three and a half years ago he had testified to the Society that the results he had obtained from the use of Lister's dressings were unsatisfactory, on account of what Dr Duncan had pointed out to be the inevitable effect of the gauze covered by pink mackintosh, that the perspiration was retained and was productive of evil. On this account he had abandoned that dressing, and had adopted a system of dry dressing similar to what they were familiar with in the practice of the late Mr Syme, but modified in accordance with the theories held at present on the application of antiseptics. In order to assimilate these dry dressings to the methods now in vogue he used boracic lint, dipping its edges in carbolic oil, a preparation which, by evaporation, lost its irritating properties. Where drainage was required he arranged fillets of boracic lint in such a way as to form a cavity, into which discharge was allowed to escape. Over this a bandage was applied, and over that again a quantity of salicylic wool of such a thickness as to prevent any discharge coming to the surface. In hardly any case of a major operation had he ever found it necessary to take down the dressings before, and he hardly ever found a case in which it was necessary to keep on the dressings longer than, three weeks. At the end of that time the parts were usually found to be absolutely healed. In amputations and excisions of the breast the results had been almost uniform. He regarded this mode of dressing as infinitely superior to the use of gauze and waterproof. With reference to the employment of sutures, he did not consider it a matter of much moment to use those which would undergo solution in a certain period. As a rule, the taking out of stitches was not productive of much inconvenience to the patient. As to drainage-tubes, he thought, if they were necessary, that those of indiarubber were best. They were better than decalcified bone or wire tubes, or a skein of worsted wrung out of carbolic acid solution. This last had not so much effect on the drainage of pus as of serous fluid, and if dressings were not changed early it was apt to become impenetrated by the granulation tissue. He had no hesitation in saying that drainage-tubes were of great value; and if the dressing was changed in a week from the day of operation, they could be productive of no harm. They relieved one to a certain degree of any anxiety as to what was going on in the wound while it could not be seen. The temperature alone was not always a safe guide to this assurance. With reference to the time when sutures should be removed, he thought Dr Duncan's statements were

correct when the wounds were covered, but for uncovered wounds the time was too long, as, for example, in hare-lip, where he thought the wires should be removed in two days. In cleft palate the same held true. He had operated on upwards of two hundred cleft palates, and always adopted this plan. He was sure that the Society was deeply obliged to Dr Duncan for his paper, and he was delighted to find it agreeing with his own views on dressings, which might possibly be entitled to some claim to originality, as he recollected some years ago being told by a distinguished surgeon in this Society that they were not in accordance with Listerian antiseptics. He had fondly imagined that every method of wound treatment, when successful in obtaining healing without suppuration and without putrefaction, was claimed as illustrative of their effects.

Mr Joseph Bell had the greatest pleasure in rising to express his almost complete concurrence with Drs Duncan and Watson in what they said. They were all getting rid of the gauze, Dr Duncan perhaps more rapidly than himself, and taking to dry dressings in the shape of salicylic and carbolic wools. The only objection he had to salicylic wool was that it caused so much sneezing while he used it, and he wondered if the experience of Drs Duncan and Watson was similar (Hear, hear, from Dr Watson). As for drainage, he felt it to be as important as antiseptics. He could not go quite so far as Dr Duncan in getting rid of the tubes. He found them specially useful in cases of major amputations and excisions of the mamma. He would be glad to hear from Dr Duncan whether the spray was used during his operations in those cases where he had not employed a drainage-tube. If it was, he would ask how he managed to prevent the irritation being set up by the carbolic, which resulted in such a profuse serous discharge during the first twenty-four hours, and which he thought was due to the carbolic spray; at any rate it did not occur in his cases where the spray was not used. He considered that a great amount of honour was due to Dr Duncan for the manner in which he persisted in bringing the value of this mode of dry dressing before surgeons. He might, however, say that in a few of his own cases the gauze and pink mackintosh seemed to have been borne well by the patients, even when worn for a very long time. In one instance a police sergeant had been sent to him from Airdrie to have Syme's amputation at the ankle performed. There was suppuration in the joint, but the man was very anxious to have his foot saved. It was therefore incised under antiseptic precautions. After a few weeks the patient went out, to come back at intervals and have the foot dressed. At first he came back every fortnight. This was soon extended to once a month. The last dressing he had remained on for six months, and when taken off the wound was found healed and the joint mobile.

Dr Kirk Duncanson asked if the surgeons who had spoken had

found any benefit from the salicylic wool as an absorbent. He used it as such to clean the ears of patients with otorrhœa, in order to the application of the dry treatment, and he found it much better for that purpose than Lawton's absorbent cotton.

Dr Cadell said the discussion was very refreshing. It would have been rank heresy to have uttered a word against the gauze a few years ago; but now they were as much against it as before they were in favour of it. He had always felt that the gauze and mackintosh prevented healing by the first intention. He expressed his gratification on hearing the change that night.

Dr Cotterill might be allowed to say that the improvements such as Drs Duncan and Watson had referred to could scarcely be said to controvert what Lister had taught us. He thought they were improvements, and Lister himself would regard them as such.

Dr Duncan said he thought the dry method, which was founded on antiseptic principles, would be preferred by all after experience of it. He preferred his own dressings to those of Dr Watson. The serous discharge referred to by Mr Bell ceased entirely within twenty-four hours. He thought Mr Bell would find that if he applied compression firmly enough the amount of this discharge would be greatly diminished. The wound might be redressed at the end of twenty-four hours, if necessary, on that account, and not looked at again till it was healed. He thought this was better than to leave it a week with a drainage-tube in, and then take down the dressing for the purpose of removing the drainage-tube and sutures.

Meeting IX.—July 5, 1882.

Mr Joseph Bell, *Vice-President, in the Chair.*

I. *The Chairman* showed a man suffering from PARAFFIN EPITHELIOMA OF THE LEFT HAND, involving chiefly the structures lying over the metacarpal bone of the thumb. It might be within the recollection of the Society that some years previously he had shown them a similar case affecting the scrotum. That was the first case of the disease described and put on record. The patient he now showed was a fellow-servant and coeval with the man whose scrotum was then affected, the two being the oldest employés in the Addiewell oil-works. The case was an exceedingly characteristic one, and there was little doubt as to its local origin and the nature of the irritation which set it agoing. The disease seemed to have taken the place of the chimney-sweep's cancer, which was so common in the days before the Act prohibiting the employment of climbing-boys was passed. The present case might remind some of the members of a gardener who was reported a great many years ago with a soot-cancer of the

hand, caused by the irritation of soot he used in manuring his garden. Of course a suitable nidus was required in order that the local irritation might produce a cancer.

II. *Dr Miller* showed a portion of INTUSSUSCEPTED BOWEL which he had removed from a child, æt. 11 months, that forenoon. The child was playing about quite well on the previous morning. It suddenly became unwell, and was seen at 8 P.M. Dr Miller was called in to consult on the following day, and diagnosed intussusception. At 4 P.M. he proceeded to operate, the state of matters being as follows:—The bowels were quite flaccid; a hard mass could be felt commencing close to the umbilicus, and passing down to the left side and sigmoid flexure. This could not be indented. It was evidently an intussusception. He examined per rectum, but nothing came away. He then began the operation under spray. An incision was made in the middle line large enough to admit the finger. This, passed into the abdomen, showed that the sigmoid flexure was empty, but the descending colon and apparently the left half of the transverse were occupied by the hard mass. The incision was then enlarged, and this portion of colon brought to light. It was filled with a dark coloured mass that could be seen through the walls of the bowel. From this a small portion of ileum hung down. On trying to undo the intussusception he found that he could withdraw the bowel little more than an inch. He then attempted, by invaginating the finger into the colon, to push the bowel out, but failed. He then noticed that a portion of the ileum and colon were agglutinated. As this would not give way, the only thing to be done was to remove this portion of bowel, which consisted of caput cæcum coli, the whole of the ascending colon, and a portion of ileum. The ileum was then stitched to the transverse colon. The bleeding was very slight. Before operation the child was semi-collapsed. Just after it, it collapsed entirely and died in about fifteen minutes. A glance at the preparation would show how much thickened the colon was. This must have greatly helped to grip the bowel and prevent its withdrawal.

III. *Dr Foulis* showed a bottle containing some ASCITIC FLUID removed from the abdomen of a lady with a malignant tumour of the ovary. He wished the Society to notice that there was in the fluid a flocculent deposit. During the last ten years he had examined some hundreds of fluids removed from the abdominal cavity. Often he had to decide whether a fluid sent for examination was *ascitic* or *ovarian*, or a mixture of both. A simple observation enabled him to do this. Although an ascitic fluid might be quite free from deposit when first drawn off from the abdomen, yet generally within forty-eight hours there appeared a flocculent deposit, such as he now showed. This deposit, when examined under the microscope, always consisted of extremely fine,

glistening fibrillæ, sometimes running parallel to each other, but more often interlacing, like the fibres of a piece of felt. Such a deposit he had never seen in a simple ovarian fluid. This might appear a very simple and unimportant observation, but by it he had never failed to distinguish between ovarian and ascitic fluids. His explanation was that *ovarian* fluid was a *secretion* poured out by the cells lining ovarian cysts, but *ascitic* fluid was an *exudation* from the blood, and contained more or less fibrine, according to the amount of inflammatory action present. In the case of a mixture of ovarian and ascitic fluid the flocculent deposit always showed itself, but involved in the meshwork of fibrillæ there were always numerous cells from the burst ovarian cysts, which could be easily recognised.

IV. The *Chairman* showed a CALCULUS which had been diagnosed as encysted before operation, and which turned out to be so. The patient, a middle-aged man, had been treated in both surgical and medical wards. There were all the symptoms of stone, but nothing could be felt by the sound. He then passed a small stone, and was somewhat relieved. He did not, however, get over all his symptoms. Frequent examinations were made, and at one of these the convexity of the staff grated on something just behind the prostate. The point, however, could not be brought to touch this. The prostate was not enlarged, but a stone could not be felt per rectum. It was then considered that if there was a stone it must be lying in a cyst behind the prostate. Preparations were made for its removal. Ordinary lithotomy was performed. The finger was passed into the bladder, and felt the stone lying in a cyst behind the prostate, as was supposed. It was tilted out of its position there by means of a sharp-angled scoop, and removed by forceps. Some days after the operation a little water passed by the rectum, showing that the cyst must have been close to it, and had to a slight extent given way. He trusted that healing would soon take place, and no permanent fistula be left. It might be thought strange that he did not feel the stone from the rectum. He could only say that after repeated examinations he could not be sure of it. The patient has gone home well.

V. *Dr MacGillivray* then read Dr Cadell's paper entitled

CASES OF STRICTURE OF THE URETHRA.

I HAVE collected the following cases more on account of the importance of conserving our experience in the treatment of this important and painful disease, than from an ability on my part to lay any new facts in regard to treatment before the profession:—

CASE I.—C., a gentleman in business, unmarried, of strumous constitution, and rather a free liver, consulted me in January

1880. Had suffered from gonorrhœa several times, and during one of these attacks, six years ago, had retention, which required the use of the catheter. Since then his stream had gradually decreased in size, until at the period of this report great straining was necessary during micturition. A No. 1 elastic bougie was passed, but by the process of interrupted dilatation no larger instrument than No. 3 could be got through the stricture, which was situated in the region of the bulb. I then tried continuous dilatation by tying in catheters, and in a few days No. 6 was reached. At this stage the treatment was stopped on account of extreme irritability of the urethra, with considerable purulent discharge and slight cystitis. It was now decided, as dilatation had failed, to rupture the stricture with Holt's dilator. The patient was prepared for the operation by enjoining careful abstention from alcohol, with a week's course of farinaceous diet. On 9th February 1880 chloroform was administered, and the stricture forcibly ruptured by Holt's dilator. Minims 25 of morphia with 12 grs. of quinine were administered after the effects of the chloroform had passed away. The hæmorrhage was slight. Urine was twice drawn off with a No. 11 catheter on the day of the operation. After that the patient passed water naturally, with very little pain, and in a good stream. Since the operation I have passed a No. 11 bougie without difficulty, at intervals of three months, and there is no evidence of recontraction. In this case interrupted dilatation failed; and I believe when that method of treatment fails we should at once proceed either to forcible rupture or urethrotomy. Continuous dilatation will, no doubt, overcome such a stricture, but recontraction soon comes on in cases where the stricture tissue is hard and resilient, as in this case.

Case II.—G. W., a cabinetmaker, æt. 45, rather intemperate, married. Had suffered in his young days from several attacks of gonorrhœa. For the last ten years had felt gradually increasing discomfort when passing water. He takes a long time to micturate, and requires to do so very frequently both night and day; latterly the urine came away only in drops.

9th April 1880.—Found slight difficulty in passing a small elastic bougie through the stricture, but then easily dilated the stricture to No. 7 at one sitting. On examining the stricture with an acorn-headed bougie, I found two narrow annular strictures about half an inch apart in the region of the bulb. Two days after, No. 11 size was reached without difficulty. A curious coincidence happened with reference to this case. His wife had borne children regularly until about five years before he consulted me. During these five years she had never become pregnant, but became so, soon after the dilatation of her husband's stricture. There is little doubt that stricture of the urethra interferes with the power of impregnation to some extent.

Case III.—J. M., æt. 60, stableman. Had retention of urine twelve months ago. Is in a state of great misery, as he cannot keep himself dry night nor day. Denies ever having had gonorrhœa.

22*nd November* 1880.—Introduced with difficulty No. 1 elastic bougie, and tied it in forty-eight hours. The stricture is situated immediately behind the scrotum. No. 1 was removed, and No. 3 put in its place. After forty-eight hours No. 4 could easily be introduced. This treatment had, however, to be stopped on account of bladder irritation, with bloody, muco-purulent urine. After giving the parts a rest, on 17th December I began dilating the stricture by the interrupted method, and by the beginning of January had succeeded in passing a No. 11 bougie. This patient did not stand well the continuous presence of instruments in his urethra. Had it not been for the difficulty of introducing a small bougie at first, I would not, in this case, have had recourse to the tying-in process.

Case IV.—G. M., æt. 62, printer.

January 1880.—Had a clap fifteen years ago. Six years ago noticed a difficulty in passing water, with frequent desire to do so. Stricture situated 4 inches from the meatus. Had been in the habit of taking about three glasses of whisky daily. With great difficulty I succeeded in passing a No. 3 elastic bougie of the French scale, equal to about half the diameter of an English No. 1, and tied it in for forty-eight hours. In a week, by continuous dilatation, got up to No. 5 English scale. After that, by interrupted dilatation, easily advanced to No. 11.

Case V.—J. H., æt. 51, had clap thirty years ago, at which time he drank heavily. Two years ago he gave up drinking, as it had such a bad effect on his bladder. His first attack of retention of urine occurred four years ago. In June 1879 was in the Infirmary for four weeks, and left without much improvement. On 12th February 1881 had retention for sixteen hours, but at the end of that time was able to pass some water with great difficulty. On 14th February I passed a No. 1 elastic bougie, and tied it in for forty-eight hours, and by continuous dilatation reached No. 10. The stricture was hard and difficult to dilate, and was situated a little in front of the bulb. The stricture showed a rapid tendency to recontraction, and on 20th March only admitted a No. 5. Without chloroform I ruptured the stricture with Holt's dilator. The patient made a good recovery.

Case VI.—A. C., æt. 40, a soldier, has served abroad, and led a dissipated life; had several attacks of gonorrhœa. In 1856 had retention of urine, which required the use of the catheter; there was again retention in 1857 and in 1872.

28*th February* 1881.—Suffers greatly from pain over bladder, and difficulty in passing water; has to get up nearly every hour at

night to make water, with great straining. There is a tight stricture in front of the triangular ligament. I introduced Nos. 1, 2, and 3 elastic bougies through the stricture.

4*th March.*—Is much more comfortable, passes water without straining, and has not to rise at night so frequently. Introduced Nos. 2, 3, 4, and 5 bougies.

In a short time a full-sized instrument could be passed.

Case VII.—J. J., æt. 25, unmarried, an officer in the army. Had suffered several times from gonorrhœa, and for a few years back noticed an increasing difficulty in passing water. This patient had two strictures, one situated 3 inches from the meatus, and another 2 inches further back. A few months before seeing him, an abscess had formed in connexion with the anterior stricture, which had burst externally, and healed without leaving a fistula. At this date (April 1881) there was a lump in the perineum about the size of a walnut, behind the posterior stricture. The lump was painful, but by rest in bed, bathing, and fomentations the inflammatory symptoms subsided. On 25th April Nos. 3 and 4 elastic bougies were passed through the strictures, when their consistency was found to be hard and cartilaginous. The perineal lump was getting smaller.

9*th May.*—Finding that no progress was made with interrupted dilatation, I tied in a No. 4 elastic catheter, which was retained for forty-eight hours. By 15th May No. 10 was reached. There was, however, slight local irritation, with an increase in the size of the perineal lump. The next day No. 10 catheter was removed, and Nos. 11 and 12 were passed easily through the stricture. No instrument was tied in, on account of the increase in size of the lump in the perineum.

23*rd May.*—As is usual after continuous dilatation, the stricture had contracted somewhat, No. 8 being the largest instrument which could be passed. The swelling in the perineum gradually disappeared, and the patient was taught to pass a bougie himself. During the next few months, although many attempts were made, no larger instrument than a No. 8 could be passed.

1*st March* 1882.—The strictures had now gradually recontracted, notwithstanding the careful efforts of the patient, and No. 3 bougie can only be passed. A gonorrhœa of six weeks' standing also complicated the case. As the strictures proved so resilient, operative interference was determined on, and, as a preparation, the patient was confined to bed and put on milk diet. The gonorrhœa being almost well, and as time was then of great importance to the patient, I performed internal urethrotomy by Maissoneuve's method on 19th March. The perineum was quite in a healthy condition, and the patient in a much more favourable state for operation than he was ten months before. Chloroform was administered, and the strictures were divided on the roof of the

urethra. A No. 12 elastic catheter was passed, tied in, and retained for three days. Troublesome chloroform vomiting occurred, which lasted for eighteen hours, with a slight rise in temperature. With that exception, there was no bad symptom. A No. 12 bougie was passed on 24th March, and again on 11th April Nos. 12 and 13. The patient was then directed to introduce a bougie himself at regular intervals. The history of this case showed the temporary character of the relief afforded by continuous dilatation when the stricture tissue is very firm and resilient. The presence of gonorrhœa was a cause of considerable anxiety, and it would be advisable, under ordinary circumstances, to allow a much longer time to elapse between the cessation of a discharge and the performance of an operation on the urethra, although, in this case, fortunately, no bad effects ensued.

Case VIII.—N. W., æt. 54, an old soldier; seen service in India. Had led a dissipated life, but said he never suffered from gonorrhœa, although he had had other forms of venereal disease. He had retention of urine six months ago, after exposure to wet and cold, and while drinking heavily. Since then has had great difficulty in passing water, the urine coming in drops with severe straining. Had very frequent calls to micturate both night and day. On 7th April 1881 I introduced with difficulty a small French elastic bougie, equal to half an English No. 1, and succeeded at that sitting in dilating the stricture up to No. 5. By 16th April a full-sized bougie could be passed.

Case IX.—J. B., æt. 45, shoemaker. Two years ago I dilated this man's stricture up to No. 12 by continuous dilatation. In April of this year he consulted me again, as the stricture had become as bad as ever.

On the first occasion I failed to pass an instrument. Four days later another unsuccessful attempt was made. At this time he suffered severely from frequent and painful micturition, the water often coming away in drops after great straining. I advised him to stay in bed one Sunday, and to take a hot bath before my visit on Monday morning. I then succeeded in passing a small elastic bougie, a size smaller than No. 1 of the English scale. This instrument I tied in, and allowed him to go to work. The urine came away easily outside the bougie, and he continued his work in comfort. The bougie was retained for three days, when a No. 4 elastic catheter was substituted for it. The catheter was retained for two days, until Saturday afternoon, 22nd April. On this day I introduced Holt's dilator and ruptured the stricture, which was situated far back in the urethra. The urine was drawn off immediately after the operation by a No. 11 catheter. No chloroform was given, and the patient did not complain of much pain. He was only two days off work. On 4th June a No. 12 bougie was introduced without difficulty.

Remarks.—In the early stage of these cases, when fine instruments were required, I invariably used elastic ones. The pain of the operation is thus minimized, and the safety of the urethra is increased. It is also much safer to tie in a small elastic instrument than a metal one. When a very fine instrument is used, a bougie is better than a catheter; it is less flexible, and so more easily manipulated, and removes the urine just as well as an extremely small catheter. When interrupted dilatation fails, it seems to be a waste of time to try continuous dilatation, except as an assistance to operative interference. Other things being equal, I consider forcible rupture with Holt's dilator a safer operation than internal urethrotomy.

The *Chairman* said he could not help thinking that the perusal of this paper must show them that what Solly called the suppurative form of treatment was a most dangerous one. The more cases of stricture one saw, the more would he be inclined to trust to interrupted dilatation with the metal instrument, which had more effect on the submucous deposit than the elastic instrument.

Dr Miller was sorry that Dr Cadell was not present. It did not do to say too much about his paper in his absence, but there was one thing they could do, and that was to praise it. They were much indebted to him for bringing his experience before them. There were one or two points worthy of remark. One of these had already been referred to by the Chairman under the title of the suppurative method of treatment. That was the system of tying in a catheter, and it was not at all conducive to the patient's comfort or advantage. With regard to Dr Cadell's remarks on Holt's operation, he would agree with him so far, that in those cases which did not readily submit themselves to the ordinary interrupted bougie treatment Holt's instrument did very well. He did not agree with him that it was necessary to dilate the stricture before Holting. Wherever the instrument, as modified by Watson (*i.e.*, made with a probe point), could be passed, the operation might be done. As to evil effects, he might say that he published some time ago a series of cases, in not one of which was there a bad result from the operation. One patient died a fortnight after it from obstruction of the bowels. The urethra was removed by himself and Professor Rutherford, and not a single scratch on the mucous membrane could be found. He believed that it was uninjured, there being no blood at the time of operation. One case of Dr Cadell's seemed to show that a stricture had occurred without a previous gonorrhœa. It struck him then what an amount of difference there was between gonorrhœa in the male and gonorrhœa in the female. He had seldom seen any harm from it occurring in his patients in the Lock wards. There were one or two cases of metritis and ovaritis that might have been due

to it, but they were very few in comparison with the number affected with gonorrhœa. There was seldom a urethritis, but almost always a vaginitis.

VI. *Dr Gibson* read Dr G. W. Balfour's paper, entitled—

ARGUMENTS IN FAVOUR OF THE THEORY OF DILATATION OF THE HEART AS THE CAUSE OF CARDIAC HÆMIC MURMURS, AND OF THE APPENDIX OF THE LEFT AURICLE BEING THE PRIMARY SEAT OF THIS MURMUR.

The valvular lesions which but a few years ago were almost the only recognised lesions of the heart, which seemed so difficult to diagnose, and to threaten life so seriously and mysteriously, are nowadays readily discovered, differentiated, and their influence as mechanical hindrances discounted. All the interest and the mystery is now transferred to the state of the cardiac muscle and its nervous relations. And of all the problems we are thus brought to face, none is so simple, and few more important, than the actual condition of the chlorotic heart, which has so long been misunderstood.

I have been led to adopt the theory of dilatation of the heart as the cause of cardiac hæmic or chlorotic murmurs, because it seems to be the only one capable of reconciling the various discrepant hypotheses regarding the origin of these murmurs.

This theory is fraught with most important instruction on the one hand, and with a no less momentous warning on the other; because, if it be true, there is no longer any real distinction between functional and organic murmurs, and a murmur can only be regarded as having been functional when it is found to have been curable. Moreover, if functional—chlorotic—murmurs are really due to dilatation, as these murmurs are known to disappear —to become cured—in by far the larger number of cases, we thus obtain the important generalization that dilatation of the heart is a curable disease. The curability of such affections becomes merely a question of degree: they are more or less curable according to the length of time they have persisted, and the extent to which the dilatation has progressed.[1] This is the lesson with which this theory is fraught, and it involves the warning; because if so-called functional murmurs are due to dilatation, and dilatation becomes incurable by persistence and exten-

[1] How glad an "Eureka" this is to Senac's doleful wail: "A mésure qu'on pénètre dans les maladies du cœur, la medicine parait plus stérile; que peut'on esperer des medicaments, par exemple, dans les dilatations du cœur."—*Traité de la Structure du Cœur, de son Action, et de ses Maladies*, Paris, 1749, vol. ii. livre iv. chap. 4, page 328.

sion, it is surely a most important matter that we should all take care that none of our cases of functional disease become organic by neglect.[1] I have adopted the theory of cardiac dilatation as the cause of cardiac hæmic murmurs for three reasons: first, because it alone seems capable of explaining rationally all the discrepancies in the prevalent theories of these murmurs; second, because it is thoroughly consistent with the results obtained by experiment; and third, because it is perfectly consonant with clinical experience.

I. *The theory of cardiac dilatation explains in a rational manner all the discrepancies in the prevalent theories as to the causation of cardiac hæmic murmurs.* The aortic orifice is the classic position of the hæmic murmur, as described by Hope,[2] Bellingham,[3] Potain,[4] and others, and of late reverted to by Marey.[5] But this hypothesis is totally at variance with the now well-known fact that the hæmic murmur, at its first appearance, though it is a basic murmur, is not propagated along the aorta or into the carotids, and has its position of maximum intensity in the neighbourhood of the pulmonary artery. On the other hand, Marchall Hughes's[6] idea, that the pulmonary artery is itself the seat of the murmur, is untenable, because there is no possible cause of murmur in the pulmonary artery in such cases which is not equally operative at the aortic orifice, or, indeed, more so; while the universally recognised basic position of the primary hæmic murmur completely excludes Parrot's[7] theory, that it originates at the tricuspid orifice. Stokes[8] is the only British authority who recognises the possibility of the hæmic murmur being occasionally mitral in position; but Walshe[9] discards this as being utterly inconceivable. Thus we have each of the four orifices of the heart described in turn by most competent authority as the point of origin of the hæmic murmur, and each of them discarded as incompetent because inconsistent with actual facts in individual cases. Considering the unanimity which prevails

[1] Not only may neglect cause permanence of the dilatation, but there is some reason to suppose that, in some cases at least, persistent regurgitation leads to inflammatory thickening of the valves, and so to stenosis of the mitral opening.

[2] *A Treatise on Diseases of the Heart, etc.*, London, 1839, p. 106 and p. 389.

[3] *Diseases of the Heart*, Dublin, 1853.

[4] *Dictionnaire Encyclop. des Sciences Médicales*, tom. iv. p. 392.

[5] *Physiologie Médicale de la Circulation du Sang*, Paris, 1863, p. 479.

[6] *Guy's Hospital Reports*, second series, vol. vii., 1851, p. 161. Skoda, Meyer, Bamberger, and Gerhardt all at one time regarded the pulmonary artery as the source of the murmur, *vide* Naunyn's paper in the *Berliner Klinische Wochenschrift* for April 27, 1868, p. 189. Von Dursh also adopted a similar view, *vide Lehrbuch der Herzkrankheiten*, Leipzig, 1868, p. 205.

[7] *Archives Gén. de Médecine*, sixième série, tome viii., 1866, vol. ii. p. 158.

[8] *Diseases of the Heart and Aorta*, Dublin, 1854, p. 533.

[9] *Diseases of the Heart, etc.*, London, 1873, p. 86.

amongst all cardiac authorities in regard to organic murmurs, there can be but one possible explanation of this extraordinary discrepancy as to the hæmic murmur, and that is, that it is a murmur which may be audible in all the various positions described. It is impossible to accept any explanation that does not keep this in view and provide for it; and it is equally impossible to accept any explanation inconsistent with the ordinary laws of sound. It may seem absurd to make the latter stipulation; yet the laws of sound are so incompatible with the theories propounded in regard to the hæmic murmur, that this very contrariety is in itself no trifling argument against the so-called functional character of the murmur. Thus Hayden,[1] who is the most explicit of all writers as to the propagation of the hæmic murmur, describes this sound as produced within the blood by friction of the blood-corpuscles against one another, by friction at the arterial outlets, and by the vibration thus produced in the walls of the heart and arteries. Yet he states that this murmur is best heard at midsternum, and "within a diffusion area of three to four inches;" that though it may be heard here and there over the arteries, it is never propagated continuously along them, and that it is never heard at the apex. Nevertheless he acknowledges that an organic murmur, produced, as he supposes, by friction at the mouth of the aorta, is propagated along the arteries, and may be heard at the apex. According to Hayden, then, a functional murmur differs from an organic one in that it is not propagated according to the ordinary laws of sound. It is never propagated along the medium in which it is produced, but, having selected a point of exit, it passes readily and directly outwards through the overlying heterogeneous media, within which it slightly radiates or diffuses itself in some inexplicable fashion. Unfortunately the immutable laws of physics forbid the acceptance of any such delusive theory. That it has been propounded by so intelligent and so generally trustworthy an observer as Hayden is only a further proof that the hæmic murmur is a varying murmur, and that for want of a proper clue he got bamboozled in attempting to follow and explain its different modifications.

II. *The theory of cardiac dilatation, as the cause of the hæmic murmur, is thoroughly consistent with the results obtained by experimental investigation.* When the late Dr Marshall Hall was engaged in investigating the effects of loss of blood upon the system, he observed that during the reaction subsequent to such loss the action of the heart was "accompanied by a peculiar noise resembling that of the saw or of the file, termed by the French 'bruissement,' and very discernible on applying the ear to the chest."[2] This "bruissement" Marshall Hall distinctly recognised as identical with the chlorotic murmur, and he accepted its

[1] *The Diseases of the Heart and Aorta*, Dublin, 1875, p. 248 and p. 252.
[2] *Medico-Chirurgical Transactions*, London, 1832, vol. xvii. p. 257.

artificial production by loss of blood as a clear proof of the purely hæmic character of that murmur.[1] Hope, who assisted Marshall Hall in making these experiments, adopts most explicitly the views of that author, and describes the murmur as due to the attenuation of the blood and the increased velocity with which it was circulated.[2] We need not now inquire whether attenuation of the blood or increased velocity of the circulation can ever be, of themselves, a source of murmur, because we have learned since that time that these phenomena, occurring in animals repeatedly bled, are always accompanied by a condition of heart which Hope himself was the first to recognise as an efficient cause of murmur. For Beau, investigating the causation of the murmurs following bloodletting, which he also acknowledged to be chlorotic in character, found that they did not accompany the anæmia primarily produced, but were developed along with the secondary spanæmia, to which he gave the name of serous polyæmia.[3] Beau also found that this serous polyæmia is invariably associated with a dilated and hypertrophied condition of the heart; and that in dogs and rabbits killed by a gradually exhausting hæmorrhage the cavities of the heart are not only manifestly dilated, but the heart itself, freed from clots, weighs from one-fifth to one-third more than the heart of a similar animal destroyed by one suddenly fatal gush from a severed carotid.[4] But as a dilated heart is nowadays universally recognised as an efficient cause of murmur,[5] it only remains to show—

III. *From the results of clinical experience,* that the attenuated blood of chlorosis, which so closely resembles that resulting from repeated hæmorrhages, is accompanied by a similar condition of heart; and that the cardiac hæmic murmur appears and disappears in a manner consistent with this theory. Wunderlich[6] and Friedreich[7] have described the chlorotic heart as dilated; while Beau,[8] Bamberger,[9] and Stark[10] have adopted the more rational view that it is hypertrophied as well as dilated; and so well established does this view seem now to be, that Dr Heitler of

[1] *Principles of the Theory and Practice of Medicine,* London, 1837, p. 370.
[2] *Op. cit.*, p. 100.
[3] *Archives Générales de Médecine,* 4ième série, tome ix., 1845, pp. 145, 149, 151, 169, etc.
[4] *Op. cit.*, p. 156.
[5] Hope was the first to point this out, *vide op. cit.*, pp 77 and 308. *Vide* also Dr M'Dowel, in the *Dublin Quarterly Journal,* vol. xiv., 1852, p. 352; vol. xvi., 1853, p. 76; and vol. xvii., 1854, p. 90. In the *Edinburgh Medical Journal,* July 1856, p. 55, Dr Gairdner has published a paper on this subject, going pretty fully into its literature; *vide* also his *Clinical Medicine,* Edinburgh, 1862, pp. 592, 597, and 600, note. *Vide* also a paper by Dr Bristowe in the *British and Foreign Medico-Chirurgical Review* for July 1861, p. 215.
[6] *Handbuch der Pathologie,* Stuttgart, 1856, Bd. iii. S. 647; Bd. iv. S. 534.
[7] *Krankheiten des Herzens,* Erlangen, 1867, S. 172.
[8] *Archives Gén. de Médecine,* 4ième série, tome ix., 1845, pp. 169 and 451, etc.
[9] *Lehrbuch der Krankheiten des Herzens,* Wien, 1857, SS. 88 and 246.
[10] *Gazette Hebdomadaire,* 1863, p. 262.

Vienna, one of the most recent writers on cardiac disease, speaks of the dilated hypertrophy of the chlorotic heart as a well-known and acknowledged fact.[1] Beau has distinctly shown that the chlorotic murmurs do not occur in simple anæmia, but only in spanæmia—serous polyæmia[2]—a condition in which the blood is not diminished in amount, but only altered in constitution, its nutritive and oxygenating properties being very much lessened. There is also an abnormal friction between the spanæmic blood and the walls of the bloodvessels, hence a rise in arterial blood-tension, hence also the formation of fluid veins at certain favourable points within the venous lumen, and at these points we hear the primary chlorotic murmur — the *venous hum.* The next abnormal acoustic phenomenon observed in these cases is an *accentuation of the pulmonary second*, unquestionably due to increase of the intrapulmonary blood-pressure, the only possible cause for this being obstruction to the onward flow of the blood; and, in a disease such as chlorosis, the most efficient cause is obviously loss of tone and contractile force in the cardiac muscle, which in this respect suffers no less than the external muscles, in all of which this loss of tone is so obvious. Less able to do its work, and with no less work to do, the heart slowly dilates, as it always does in similar circumstances; and it also slowly hypertrophies, as it must do to prevent things from coming to an absolute standstill. The dilatation is due to loss of muscular tone or elasticity; the hypertrophy to that natural law by which a hollow muscle hypertrophies when opposed to an obstacle with which it is still able to cope. And that the heart, under these circumstances, is still able to cope with its troubles is due to the fact that it always works well within its powers, and has a large reserve of energy to call upon when required.[3] As the heart dilates, the mitral and tricuspid valves become incompetent, and the resulting regurgitation gives rise to murmurs. The regurgitation through the tricuspid produces undulations in the jugular veins; and the abnormally large ventricular blood-waves, coupled with the abnormal friction of the spanæmic blood at the arterial orifices, give rise to systolic murmurs in the aortic and pulmonary

[1] *Wiener Medicinische Wochenschrift*, June 1882, S. 654.

[2] *Archives Gén. de Méd.*, 4ième série, tome ix., 1845, p. 145, p. 169, etc. In this paper, and in Marshall Hall's paper in the *Medico-Chirurgical Transactions* for 1832, vol. xvii., will be found a full account of the development of the hæmic murmur after bloodletting, showing the rapid way in which it sometimes develops, and the interesting manner in which further bloodletting temporarily arrests it, apparently by diminishing the force of the heart's contractions and reproducing a condition of anæmia. In some states of pernicious anæmia—really spanæmia—in man, similar murmurs and a similar state of heart is found. *Vide* Balfour *On Diseases of the Heart*, second edition, 1882, p. 173, note.

[3] *Vide* Rosenbach, "Ueber artificielle Herzklappenfehler," *Archiv für experimentelle Pathologie und Pharmacologie*, Leipzig, 1878, S. 1. Also Balfour *On Diseases of the Heart, etc.*, second edition, 1882, p. 84 and p. 137, note.

areas, which are also propagated along the carotids, and may be heard on the slightest compression in every artery in the body.

Thus in advanced chlorosis we have murmurs in every cardiac area—the earliest indication of any lesion of the heart being an accentuated pulmonary second, due to loss of tone of the left ventricle. I am sure that we all agree with Hayden that the primary cardiac hæmic murmur is basic; that it is not propagated in any special direction, but radiates round the pulmonary area, in the neighbourhood of which its position of maximum intensity lies. It has already been pointed out that there are—in chlorosis—no causes of murmur operative at the pulmonary orifice which are not at least as active at the aortic opening, so that a pulmonary murmur would certainly be accompanied by an aortic murmur also, and the latter would, of course, be propagated along the course of the aorta, and more or less distinctly into the carotids. This primary murmur cannot, therefore, be pulmonary; and, indeed, on careful examination, its position of maximum intensity is found not to be over the pulmonary artery at all, but from one to two inches to the left of the sternum, in the second interspace. In this position this murmur is to be detected at its very earliest appearance, quite to the outside of the pulmonary artery: here, too, I rarely fail to detect, at least during expiration, some faint pulsation; and occasionally this pulsation is so great as to form an evident tumour, which has been made to record its own movements graphically,[1] and which, upon one occasion at least, has been mistaken for aneurism by a very competent physician.[2] Both Walshe and Hayden recognise "percussion-dulness in the second left interspace," with pulsation in the second, or second and third left interspaces, about one inch from the sternum, as physical signs indicative of dilatation of the left auricle;[3] and Dr Gibson's graphic records very distinctly prove the auricular source of the pulsation in those few cases in which such records have been obtained. There seems, therefore, no reason to doubt that in these special cases, and it is plainly to be inferred that in all cases presenting similar if less well-marked characteristics, this murmur is propagated outwards from the dilated appendix of the left auricle.

A basic systolic murmur, occupying precisely the position of the primary chlorotic murmur, is not unknown in other forms of cardiac dilatation, and it has been long recognised as of common occurrence in cases of mitral stenosis, in which, also, a pulsation —in the second left interspace—due to the appendix of the left

[1] *Vide Lancet*, September 1877, p. 418; and *Ed. Med. Jour.*, October 1877, p. 299; also May 1878, p. 1012, and August 1882, p. 116. In the latter especially the tracings are shown to be neither arterial, ventricular, nor belonging to the *conus arteriosus*, nor to the true auricular systole, but to be produced by regurgitation from the ventricle into the auricle.

[2] *Vide* Balfour, *op. cit.*, p. 176.

[3] Hayden, *op. cit.*, p. 576; Walshe, *op. cit.*, p. 31.

auricle is of no infrequent occurrence. Various explanations have been given of the position and mechanism of this murmur, but it was reserved for Naunyn[1] to prove that it really depends upon mitral regurgitation. The fluid veins formed at the mitral orifice impinge upon the tense auricular wall, and throw it into sonorous vibrations, which are conveyed to the chest wall by the appendix of the left auricle, which lies in contact with it at the base of the heart.

Naunyn's views have been accepted by Paul Niemeyer,[2] Gerhardt,[3] and all recent authorities. The basic position and auricular character of a mitral regurgitant murmur in certain cases is therefore an acknowledged fact. That the primary cardiac hæmic murmur has a similar origin, seems to be proved by these facts:—(1.) In chlorosis the heart is dilated and hypertrophied, and the primary murmurs are certainly not arterial in character; (2.) The position of maximum intensity of the primary hæmic murmur and of Naunyn's murmur is precisely the same; and (3.) The graphic record of the pulsation in both classes of cases is similar; and as it is known to be auricular in the one, it is most probably auricular in the other also, especially as it is certainly neither ventricular nor belonging to the conus arteriosus.[4] The dilated condition of the heart, even in the very earliest stage of chlorosis, is to be inferred from the apex beat being either entirely absent or only faintly perceptible—not in the usual position, but just beneath the lower part of the sternum.[5] This is due to the dilatation of the right ventricle, which dilates *pari passu* with the left ventricle, and, like a water-cushion, separates it from the chest wall, leaving the dilated appendix of the left auricle the only part of the left side of the heart in contact with the chest wall. The peculiar position of the primary hæmic murmur is no doubt largely, if not wholly, due to this. Shortly after the appearance of the primary hæmic murmur, a tricuspid murmur and jugular undulation are found to be developed. This is naturally accompanied by a pulmonary and also by an aortic systolic murmur, the active cause in the production of both these murmurs being the large blood-waves sent on by the dilated and hypertrophied ventricles, as was first, I believe, pointed out by Beau.[6] The aortic murmur is, of course, propagated into the carotid arteries. About the same time we also have a systolic murmur in the mitral area; but this is probably due to the right

[1] *Berliner Klinische Wochenschrift*, April 1868, p. 190.

[2] *Handbuch der Percussion und Auscultation*, Erlangen, 1870, Band ii. Abtheilung 1, S. 140.

[3] *Lehrbuch der Auscultation und Percussion*, Tübingen, 1871, S. 283.

[4] *Vide Ed. Med. Jour.*, August 1882, pp. 121, 128, and 129.

[5] In advanced chlorosis there is no difficulty in observing this; nor is there any difficulty even in the very earliest stage, provided the patient is quiet, but on any excitement the still powerful left ventricle forcibly asserts itself, dashing aside the feeble resistance presented by the slightly dilated right.

[6] *Op. cit.*, 1845, p. 158; and *Traité d'Auscultation*, Paris, 1856, p. 336, etc.

ventricle being now so dilated that its apex occupies the position of the left apex in health.

It is only rarely, and chiefly in a peculiar class of cases, that we have an opportunity of watching the gradual development of the hæmic murmur from area to area; but we all have frequent enough opportunities of tracing the involution of this murmur; and, if carefully observed, it will be found to die off precisely in the reverse order to that which I have described, the venous hum being the last to disappear.

With a short auricular appendix it is, of course, quite possible that the primary hæmic murmur may be pulmonary, or aortic, or even tricuspid in character. But though such a state of matters is undoubtedly possible, it must be extremely rare. I have never seen any such case myself; but, were it to occur, it would strengthen and not invalidate my position. My argument is, that the cardiac murmurs of chlorosis are formed in a dilated and hypertrophied heart, and that the primary position of the murmur is in by far the larger proportion of cases, if not in all, to be found over the left auricular appendix, where it comes up from behind just to the left of the pulmonary artery.[1] Having shown this theory to be consistent with physics, with the results of experiment, and with clinical experience, I now leave it with my professional brethren, assured that, if not now, at least ere long, it will be universally adopted.[2]

VII. *Dr Gibson* also read for Dr Balfour, in reply to the paper of Dr Russell of Carlisle, the following communication:—

NOTE ON THE POSITION AND MECHANISM OF THE HÆMIC MURMUR.

Through the courtesy of Dr Russell I have had an opportunity of reading his paper "On the Murmurs of Debility in the Pulmonary and Tricuspid Areas,"[3] and I propose now to offer a few remarks on his conclusions.

When Dr Russell says, "It has not been *seriously denied* that in such cases (chlorosis, etc.) there is relative insufficiency of the mitral valve," he must be well aware that, even if he speaks for others besides himself, these words by no means express the opinion held by those British writers who are justly regarded as authorities upon cardiac disease. And when, after a little explanation of the manner in which this insufficiency is brought about and is indicated, he goes on to say, "So far, the facts may be accepted as indisputable, and the inference of mitral regurgita-

[1] Even with an undilated auricle, this is the usual position for the appendix, "as the organs lie *in situ*." Walshe, *op. cit.*, p. 4.

[2] For a fuller account of the position and mechanism of the hæmic murmur, *vide Lancet*, September 1877, p. 383; and Balfour, *op. cit.*, p. 165, etc.

[3] *Vide* page 97.

tion granted without hesitation," Dr Russell so fully concedes all I am contending for, that I feel inclined to condone whatever else may seem to me to be erroneous in the views he broaches. Dr Russell speaks of "the murmurs of debility in the pulmonary and tricuspid areas." Those of you who heard or have read his paper are aware that in reality he speaks of what has hitherto been termed the hæmic or chlorotic cardiac murmur, and that it is only in deference to the novel doctrine of its mechanism which he has adopted that he has thought it right to propound a new nomenclature. While largely agreeing with Dr Russell as to the mechanism of this murmur, I think the time has not yet arrived for its renaming, and that in comparing our own views with those of our predecessors and contemporaries, we shall be enabled more accurately to define our own position, and to avoid all mistakes and confusion, by retaining its old and well-known name, and continuing to call it the hæmic murmur,—notwithstanding that every word we write is an energetic protest against the original meaning of this term, a meaning which is still held most tenaciously by all recognised British authorities, though it is contradicted by every fact in nature, and by every law in physics bearing upon the phenomena in question.

Hope is our earliest author of note on the subject of cardiac murmurs, and he gives forth no uncertain sound as to his opinion of the causes of the hæmic murmur. According to him these causes are threefold:—"1. Attenuation of the blood; 2. Unfilled arteries permitting unusual vibration of their walls and a rippling current; 3. A certain velocity of the current occasioned by abrupt contractions of the heart."[1] You can have no difficulty in perceiving from this that Hope regards even the more truly cardiac portion of this murmur as strictly arterial in character. "It is," as he elsewhere remarks, "confined to the aortic orifice (so far as I have yet discovered), and to the first sound."[2] And this classic position of the hæmic murmur, as also this classic idea as to its causation, still remain paramount throughout the works of all recognised British authorities; very few being able even to conceive it to be audible in any other position than the base, while to all, almost without exception, it is a purely blood murmur—as its name imports—produced by the circulation of an abnormal blood through a normal heart. In regard to the cause of such abnormal sounds, Hayden says, "Hæmic murmurs, as the name implies, are of blood origin, or due either directly or indirectly to an alteration in the quantity or in the corpuscular constitution of the blood. They may be located in the heart, the arteries, or the veins;"[3] and at another place he says, "At least two factors enter into the causation of hæmic murmurs, viz., 1. *Friction* of the blood cor-

[1] *A Treatise on Diseases of the Heart, etc.* John Churchill, London, 1839. P. 102.
[2] *Op. cit.*, p. 389.
[3] *The Diseases of the Heart and of the Aorta.* Dublin, 1875. P. 245.

puscles, (*a.*) against one another, and (*b.*) against the edges of the opening and the walls of the vessel; and 2. *Vibration* of the heart and walls of the vessels."[1] While he is equally dogmatic as to the position where they are best heard, equally conclusive as to their complete dissimilarity to organic murmurs, and equally certain as to the inconsequential manner in which they are propagated. "Cardiac murmurs," he says, "of hæmic origin are invariably basic, they are loudest at midsternum or in the anatomical site of the orifices of the aorta and pulmonary artery; with this point as a centre, they have a diffusion-area of three to four inches in diameter, according to the intensity of the murmur and the conducting qualities of the chest wall; but they never exhibit a definite line of propagation, as is the case with organic murmurs in this situation.

"Not unfrequently, but only in aggravated examples, murmur likewise exists at some point of the ascending and transverse aorta, and in the carotid and subclavian arteries, but never, as far as I have observed, in unbroken continuity throughout these vessels,—a feature in which they differ from organic murmurs at the mouth of the aorta. The latter are, moreover, not unfrequently audible at the apex, though with diminished intensity; the former never."[2] I have selected these statements of Hayden, not only because they are the most recent authoritative exposition of the position and mechanism of the hæmic murmur, but also because they are in entire accordance with the opinion of other British authorities, and are withal so full and precise that we cannot mistake his meaning, though we may deem it inconceivable how he could justify his views even to himself. At another time I hope to submit these opinions to a little healthy criticism; at present I only quote them to show that, in regard to the causation of the hæmic murmur, Dr Russell is on my side, and not on that of the authorities. As Stokes is almost the only British authority who recognises the possibility of the hæmic murmur ever being audible at the apex,[3] and as all the others agree with Hayden, it is needless to do more at present than quote the very strong statement of Dr Walshe, who says, "the doctrine of some observers, that true blood murmur may be *systolic* in time and seated at the apex, appears to me wholly untenable; how deficiency of red particles in the blood can lead to its reflux through the mitral orifice I am at a loss to conceive."[4] But that which Dr Walshe regards as "inconceivable," Dr Russell accepts as "indisputable," and to this extent, and this really involves the whole question at stake, I have

[1] *Op cit.*, p. 248. [2] *Op cit.*, p. 252.

[3] *Diseases of the Heart and Aorta.* Dublin, 1854. P. 533:—"I am strongly under the impression that not only the prolongation of the first sound, but also the murmur in fever, may occasionally be found under the lowest portion of the sternum."

[4] *Diseases of the Heart.* London, 1873. P. 86.

to welcome him as a most acceptable ally. Unfortunately, the points on which we differ are put so strongly, and yet so inconsequently, by Dr Russell, as very much to lessen the value of his alliance.

Dr Russell objects to the primary basic portion of the hæmic murmur being looked upon as transmitted through the auricle.

I. *Because he has never seen an auricle so enlarged as to warrant the belief that it is the cause of the pulsation claimed for it.* This is to be regretted for his own sake, but it is not much to be wondered at in an experience so limited as only to afford three corroborative cases, and it cannot be allowed to affect the credibility of those, myself among the number, whose larger experience enables them to speak with perfect confidence in regard to such an auricular enlargement. Still less does it justify Dr Russell in stating that even in mitral stenosis such an enlargement of the auricle is "not only not observed," but is "a pure assumption," or in stigmatizing Rosenstein as possessed of an undesirable "play of imagination," because he states that in mitral regurgitation the auricular appendix lies upon the pulmonary ostium. Dr Russell seems not to be aware that even in health the appendix of the left auricle is so commonly visible in front lying on the base of the left ventricle, close to the pulmonary ostium, that Walshe describes this as the usual appearance "as the organs lie *in situ*." "The middle point of this auricle," Dr Walshe goes on to say, "from above downwards corresponds to the cartilage of the third rib; the auricle encroaches to a variable extent on the second and third interspaces."[1] And Sibson says "the appendix of the left auricle, which during the diastole of the ventricle is scarcely visible, descends during the systole, and moves rapidly forwards and downwards, so as to replace the retreating ventricles, and to fill up the angle between them and the pulmonary artery."[2] But what happens during the auricular diastole is merely a minor and transient phase of the auricle as it is when permanently dilated, and this has been so long and so well known that Stokes describes a temporary dulness, occupying the whole of the upper part of the left chest, as probably depending upon a sudden and excessive dilatation of the left auricle.[3]

Both Hayden and Walshe recognise "percussion dulness in the second left interspace," with pulsation in the second and third left interspaces, about one inch from the sternum, as physical signs indicative of dilatation of the left auricle.[4] And Naunyn speaks distinctly of the dilated appendix of the left auricle winding round the pulmonary artery to reach the anterior surface of the

[1] *Op. cit.*, p. 4.
[2] *Reynolds's System of Medicine*, vol. iv. London, 1877. P. 67. *Vide* also p. 80.
[3] *Op. cit.*, p. 204.
[4] Hayden, *op. cit.*, p. 576. Walshe, *op. cit.*, p. 31.

heart,[1] and speaks of it as too well known a fact to require any proof. Yet he did prove it, for after death he stuck needles into that part of the chest wall where, in mitral insufficience, the basic murmur was heard loudest, and he found the needle sticking in the appendix of the left auricle in the position described. Dr Gibson has caused the pulsations of these dilated auricles to record themselves graphically in a most unmistakable manner;[2] and I myself have often seen these before death, and have frequently seen them after death overlying the pulmonary ostium and the base of the left ventricle. Nevertheless, such an auricle is not a sight to be seen every day, and I can readily believe Dr Russell has never seen one; but this is no justification of the strong language he has employed in regard to those who have described a phenomenon which he ought to have known is much more common than thrombosis, and is accepted by all the best authorities as an indisputable fact.

II. *Dr Russell holds that his second case proves conclusively that neither the auricle nor the appendix is the seat of the hæmic murmur.* This case died of pernicious anæmia. The apex beat in the fifth interspace, and dulness in the second interspace, extended outwards for a distance of one inch. There was a faint blowing murmur over the apex, and this attained its maximum intensity in the second interspace, half an inch to the left of the sternum. *Post mortem* the origin of the pulmonary artery is said to have been under the second rib, the right ventricle (conus arteriosus) is also said to have extended in the second interspace for two inches to the left of the sternum. The left auricular appendix was not visible in front at all, and the heart had to be turned aside to bring it into view as it lay behind.

I think I may be permitted to doubt that this case conclusively proves anything at all. Had it been narrated with sufficient accuracy, I might very well accept it as an instance of the mode in which the hæmic murmur is developed in a heart with a preternaturally short *appendix auriculi*, such as we see now and then, though rarely. Unfortunately, the position of the auricle *post mortem* is no proof of its state during life, and where there is no mitral stenosis, an auricular appendix beating in the second interspace during life, may very well empty itself and contract out of sight in the act of dying. It is quite common for arteries which seem during life to be large, dilated, and apparently aneurismal, to be found after death of scarcely more than the normal calibre, and I now refer to arteries which can be seen and felt, as well as percussed and listened to. We are all acquainted with the phenomenon of concentric hypertrophy of the ventricles, and there is no doubt that a similar state of the auricle is of occasional occurrence,

[1] *Berliner Klinische Wochenschrift*, April 1868, p. 190.

[2] *Lancet*, Sept. 1877, p. 418; and *Ed. Med. Jour.*, October 1877, p. 299, and May 1878, p. 1012, also August 1882, p. 118.

and that it is quite capable of accounting for the retrogression of the auricular appendix. There are, undoubtedly, a few occasional cases of short auricular appendix; it is possible that the hæmic murmur in them makes its first appearance as a tricuspid murmur, but it might also very well, from my point of view, first become audible in the classic position as an aortic systolic murmur. Such abnormal cases prove my position, instead of disproving it, and they help to account for the discrepancy of views in regard to the position and mechanism of the hæmic murmur. But they must be very rare; I am not conscious of having ever seen one, and the case in question is so imperfectly narrated that we have no certainty that it has been of this character. For example, the right ventricle (conus arteriosus) was found *post mortem* to extend outwards in the second interspace for a distance of *two inches* to the left of the sternum; but during life percussion dulness was not found beyond *one inch* from the sternum, and the position of maximum intensity of the murmur is said to have been over the centre of this dulness (half an inch from the sternum). Also, the apex of the heart during life was held to beat in the fifth interspace, half an inch outside the nipple line, yet the origin of the pulmonary artery was found *post mortem* to lie under the second rib (exact position not stated). But an enlargement of the heart upwards from the fifth interspace to the second rib is so altogether contrary to experience, that it ought to have been verified by careful measurement, and in the absence of this verification it cannot, I fear, be accepted. Apart from the *post mortem* appearances, this case, from the physical signs found during life, resolves itself into an ordinary case of dilated heart with hæmic murmurs. The contracted auricle is of no value one way or another, being an exceptional phenomenon in any case, while the other appearances are so unusual, as described, that they cannot be accepted unless properly verified.

III. *Dr Russell found some of his hæmic murmurs so harsh, that he looked on them as at least partly frictional in character.* The hæmic murmur is well known to present occasionally every possible variety of character, but I quite agree with Walshe that "permanent harshness and high pitch are never associated with true hæmic murmur,"[1] and a frictional hæmic murmur is to me alike unknown and incomprehensible.

IV. *Dr Russell regards the endocardiac portion of the hæmic murmur as produced in the pulmonary artery by the pressure of the dilated left auricle pressing on the back of the artery, constricting it, and giving rise to fluid veins within it.* This argument is based upon the fact that a firm, inelastic tumour, tightly embracing an artery, or any tumour resting upon an artery with sufficient weight to compress it, gives rise to a murmur by constricting the arterial lumen and producing fluid veins within it. But it is

[1] Walshe, *op. cit.*, p. 87.

absolutely impossible that the left auricle can ever so compress the pulmonary artery. Anatomy teaches us that the left auricle lies lower than the pulmonary artery, with which it only comes in contact at its upper part, just where the sinus passes into the appendix. Any pressure exerted on the pulmonary artery by the left auricle must therefore be exerted obliquely upwards and over a very limited area, the pulmonary artery being, to some extent, protected by the aorta, which lies between it and the auricle.[1] Moreover, to gain a fulcrum from which to act, the left auricle must be so dilated as to rest upon the vertebræ, and must thus compress both the œsophagus and the descending aorta. We need, however, be under no apprehension of any inconvenience from this, as the difference of the blood pressure within the pulmonary artery and the aorta is so great (83·3 mm. Hg. in the one and 250 mm. Hg. in the other), that the circulation through the former would be completely blocked long before any appreciable compression could be exerted on the latter. Indeed, in order that the pulmonary artery may be sufficiently constricted to give rise to a murmur during the ventricular systole, it is necessary to suppose that there is a minimum pressure within the left auricle, during its diastole, greater than that within the pulmonary artery at its maximum. But it is so obviously impossible that the circulation could be carried on under these conditions, that I need not say that this hypothetical cause of a pulmonary murmur is absolutely untenable.

To conclude, I may say that I agree with Dr Russell when he says that hæmic bruits, "murmurs of debility," are always due to a dilated heart. I also think it possible that we may now and then meet with cases with a short *appendix auriculi*. In those cases I would, however, expect the primary murmur to be heard in the classic position, in the first place at all events, though no doubt it would be almost simultaneously audible in the pulmonary artery and in the tricuspid area. But I have never seen any case of this kind, and they must be extremely rare. I regret that, for the reasons already stated, I cannot agree with any of the other opinions Dr Russell has advanced. They display, to use his own expression, a flight of imagination which, though it does not transcend, is at least equal to anything of the kind I am acquainted with in connexion with cardiac pathology.

The *Chairman* said the Society was much indebted to Dr Gibson for reading these learned and interesting papers of Dr Balfour's. They would be glad to hear Dr Russell in reply.

[1] For the anatomical relations of left auricle, *vide* Todd's *Cyclopædia of Anatomy and Physiology*, vol. ii. pp. 578 and 582; Luschka, *Die Brustorgane des Menschen*, Tubingen, 1857, tafeln. iv. and v.; and Pirogoff's *Anatomia Topographica*, Petrop., 1859, fasciculis ii. tabulæ 6, 7, 8, 9; and fasciculus ii. a tabula 4, fig. 2, and tabula 6, fig. 2.

Dr Russell said that when he had the honour of making a communication on this subject some time ago, he did not expect that he would make a disciple of Dr Balfour, nor did he expect that he (Dr Balfour) would handle him lightly, because they all knew his hand was not a light one in such matters. He could scarcely reply at once to all that Dr Balfour had said against his theory, because Dr Balfour had had three months to prepare this paper, and bring up all the heaviest artillery he could command, and to this he could not immediately reply. As to the relative positions of the pulmonary artery and left auricle, as far as Sibson and Quain were right, the one was immediately behind the other, and his own observations led him to believe they were so placed that they could not be distended without pressing on each other. He was surprised that Dr Balfour should have misinterpreted his contention and the distinction he (Dr Russell) drew between the auricle and its appendix. Dr Balfour thought he (Dr Russell) was not familiar with the fact that the left auricle was dilated. He was familiar with that, and that the left auricle might be so distended as to compress a primary bronchus, but he held it was still to be proved that the left appendix was so dilated as to cause the murmur heard in the second and fourth interspaces. Dr Balfour said that if the left auricle caused the pressure on the artery which he maintained it did, the pulmonary circulation would be stopped, and so it would if the heart did not adapt itself to the circumstances. What he maintained was, that there was a rotatory movement of the heart to the left, by which the auricle was carried away from immediately behind the pulmonary artery, and in this way the circulation was enabled to go on. In cases of debility the auricle was not sufficiently displaced to remove it from its normal position behind the pulmonary artery, and therefore the pulmonary artery was compressed and a murmur thus produced. He did not know that he could take up any other points than these. There were several things that might be said in the matter, and Dr Balfour, he thought somewhat unnecessarily, pooh-poohed some of his observations, because it was not possible or necessary to enter fully into the records of post-mortem examination in such a paper to a society. He should, however, like to ask if Dr Balfour had seen many post-mortem examinations of cases of chlorosis? Such had not been his experience, and he hoped it never would, as he preferred to treat them in another way. He should like to know if Dr Balfour had seen many cases of debility where he had traced the murmur before death, as he (Dr Russell) had done, and if he had followed them to the post-mortem table, and in what way he had made his observations. He had previously taken the liberty of detailing how he had made his examinations by inspecting the heart *in situ* through the interspaces. It was no use cutting out the heart first to examine the cavities and measure the auricular appendix. What they

wanted to know was, what parts were visible in the interspaces where pulsation was visible. He had not dissected more than one to two hundred bodies; but he had in that time taken great interest in Balfour's auricular murmur, and he maintained that the dilatation of the auricular appendix was not sufficient to produce the murmur, as Dr Balfour said it did. In one of his cases the auricular appendix was behind, so that he had to turn the heart right round to get a view of it. He had to thank the Society for their kindness in allowing him to reply.

Dr Gibson said it would not become him to throw himself between the combatants in this fray. He had already stated his acceptance of Dr Balfour's theory. All he would contend for was that tracings taken of the pulsation in the second left intercostal space gave no evidence of its being arterial, and he therefore thought it could not be due to the pulmonary artery nor to the conus arteriosus, as Dr Russell had suggested. He had been able to obtain tracings of the conus arteriosus pulsation in a case of split sternum, and these by no means corresponded with the pulsation got in cases of debility and chlorosis. Secondly, the pulsation agreed perfectly in rhythm with what one would expect from a regurgitant wave passing from ventricle to auricle.

The Chairman thought the Society owed a debt of gratitude to Dr Russell for starting this discussion, and as Dr Balfour had taken three months to answer him, he had now an opportunity of taking three months to answer Dr Balfour.

VIII. Professor Struthers of Aberdeen having been called to the Chair, Mr Bell, Vice-President, read his paper entitled

ON A RARE FORM OF SENILE GANGRENE.

W. H., æt. 75, a very healthy, temperate, contented old man, of spare habit and fairly healthy arteries, was sent into Hospital, under my care, by Dr Bentley of Kirkliston, on 17th January 1882. The second toe of his right foot was black and evidently dead. He said that a few days before admission he had met with an accident, the iron plate of a retort having fallen on his foot. The whole foot was red and swollen; not much pain, and no constitutional disturbance. On 24th January the dead toe was nipped off with scissors, no blood being lost; the tendons alone required division. The bones were noticed to be curiously macerated, as if they had lain long in water. In another fortnight the third toe, which on admission had been alive and healthy, except for a slight redness, also died and was lifted off, the bones being macerated, and this time the tendons also destroyed. The resulting gap left by the removal of these two toes was large but painless, and suppurated freely with little odour. Up to 10th March all went well, and the wound was nearly healed. The extremi-

ties of the second and third metatarsals had separated from their shafts at the epiphyseal junction, and were lifted out with ease.

On 10th March, however, without either pain or elevation of temperature, a dark blush was noticed all over the great toe, which had hitherto looked healthy, and half way up its metatarsal bone. The circulation in this area was exceedingly sluggish, the finger leaving a white dimple on pressure, which took several seconds to refill with blood. After two or three days of doubt a bulla was noticed to form just on the dorsum of the metatarso-phalangeal joint. This bulla rapidly raised the cuticle to the size of a florin, and, being cautiously cut into, showed the true skin, not, as usual in such cases, either shrivelled up or sloughing, but as if it had melted into a shreddy pultaceous mass, and this involved not only skin, but cellular tissue, ligaments, and periosteum, for by 20th March, without any displacement of parts, suppuration, or odour, the proximal phalanx and metatarsal head were both exposed as if thoroughly macerated, and lay loose in this pultaceous mass. The edges of the ulcer or cavity were everted and undermined as if by a gumma, were of a pinky redness, but exhibited no granulations or any attempt at repair. Having watched many cases of senile gangrene to death or recovery, and having had two or three cases of gangrene from embolism also for months under careful observation, I am quite familiar with the usual processes of separation, whether moist or dry; but I have never seen or read of any case in the least resembling this one, whether in its rapidity of maceration of tissue, its curious cessations or intermissions, its freedom from pain, and apparently trifling effect on the constitution.

The treatment was purely expectant, no interference that could be avoided, absolute rest in bed, milk diet, which was well borne, and locally keeping the limb at an equable temperature by cotton wadding (carbolized) and marine lint to sop up discharges.

The result has been remarkable. To-day, 30th June, the apparently dead and macerating heads of metatarsal and first phalanx have recovered themselves, granulations have formed, and now the wound has closed, with the exception of a line of granulations about a quarter of an inch long and one-sixth of an inch broad, under which can be felt a thin scale of carious bone. The old man is quite well, and goes home this week.

Professor Struthers said he had to apologise to the Society for finding himself in the position he occupied. There was nothing he looked back on with greater pleasure than the meetings of their Society. The paper they had just heard reminded him of the days when Mr Bell was one of his prize students in his class at Surgeon's Hall.

IX. *Dr Foulis* gave a demonstration of the CIRCULATION IN THE WEB OF THE FROG'S FOOT, with oxy-hydrogen light.

INDEX.

EDINBURGH: PRINTED BY OLIVER AND BOYD.